

# HUMAN BIOLOGY (HUMBIO)

## **HUMBIO 11. Meet HumBio: a lecture series introducing HumBio themes. 1 Unit.**

A lecture and discussion series designed for freshmen who want to learn more about Human Biology - either the major itself or the topics within its realm - by hearing about a HumBio perspective on the public health response to the COVID-19 pandemic. Each week the class will feature a guest speaker, often a HumBio faculty member or alum, addressing three central questions: What do I do? How is it important for protecting or promoting the public's health? and What professional opportunities are possible for a person concentrating in my field? The course is not meant to cover a specific body of content, therefore the assignments for the class aim to build fundamental study skills. These include taking useful notes, articulating questions or ideas prompted by the presentations, connecting lecture topics with current events or journal articles, and paying full courteous attention to speakers and peers. There will be no required readings or exams.

## **HUMBIO 112. Conservation Biology: A Latin American Perspective. 3 Units.**

Principles and application of the science of preserving biological diversity. Conceptually, this course is designed to explore the major components relevant to the conservation of biodiversity, as exemplified by the Latin American region. The conceptual frameworks and principles, however, should be generally applicable, and provide insights for all regions of the world. All students will be expected to conduct a literature research exercise leading to a written report, addressing a topic of their choosing, derived from any of the themes discussed in class. Prerequisite: BIO 101 or BIO 43 or HUMBIO 2A or BIO 81 and 84 or consent of instructor.

Same as: BIO 144, BIO 234

## **HUMBIO 113. The Human-Plant Connection. 3 Units.**

The intertwined biologies of humans and plants, particularly the ways in which people and plants have imposed selection pressures and ecological change on one another. Topics include evolution and basic plant structure; plant domestication; effects of agriculture on human health and physiology; plants in traditional and contemporary diets; and human influences on plant biology through genetic manipulation and environmental change. Class meetings center on journal articles. Final project includes written and multimedia presentations. Prerequisites: HUMBIO 2A or BIO 81 and BIO 82 or consent of instructor.

## **HUMBIO 113S. Healthy/Sustainable Food Systems: Maximum Sustainability across Health, Economics, and Environment. 4 Units.**

Focus on problems with and systems-based solutions to food system issues. Four particular settings are addressed: University, worksite, hospital, and school food. Traditional vs. disruptive food system models compared and contrasted. The goal is to determine how best to maximize sustainability across several dimensions, including health, economics, and the environment. Underlying class themes include social justice and the potential for changing social norms around food production and consumption. Discussion-based seminar. Prerequisite: Human Biology Core or Biology Foundations or consent of instructor.

Same as: CHPR 113

## **HUMBIO 114. Global Change and Emerging Infectious Disease. 3 Units.**

The changing epidemiological environment. How human-induced environmental changes, such as global warming, deforestation and land-use conversion, urbanization, international commerce, and human migration, are altering the ecology of infectious disease transmission, and promoting their re-emergence as a global public health threat. Case studies of malaria, cholera, hantavirus, plague, and HIV.

Same as: EARTHSYS 114, EARTHSYS 214, ESS 213

## **HUMBIO 116. Climate Perspectives: Climate Science, Impacts, Policy, Negotiations, and Advocacy. 3 Units.**

The course contains four main parts: Climate Science, Climate Impacts, Climate Policy, Climate Advocacy. Part I begins with a detailed introduction to climate science, including an assessment of arguments by climate science skeptics, and an examination of climate change models. Part II describes the impacts of climate change on the planet, human health, species and biodiversity, and it adds an economic perspective on the costs and benefits of responding now or later to climate change. Part II also include a discussion on climate change ethics, i.e., fairness and responsibility among individuals, nations, and generations. Part III focuses on climate policy, from the Kyoto Protocol to the Paris Accord. Part III also includes an introduction to how the public and officials have viewed climate change over time, and it explores factors that make widespread formal agreement difficult. Part IV looks forward to climate advocacy and what to expect from future of climate negotiations. Enrollment limited to students with sophomore academic standing or above. Prerequisite: Human Biology Core or Biology Foundations or consent of instructor (i.e. background in earth systems, economics, policy).

Same as: PUBLPOL 116

## **HUMBIO 120. Health Care in America: An Introduction to U.S. Health Policy. 4 Units.**

Health policy and health care delivery from a historical and a current policy perspective. Introduces cost, quality, and access as measures of health system performance. Considers institutional aspects of health care reform and whether health care should be a right of all Americans. This course emphasizes the historical and cultural factors that have affected the evolution of our health care system in areas such as Medicaid, Medicare, and the development of managed care systems. Note: HUMBIO courses in the 120s (specifically HUMBIO 120, HUMBIO 120A, HUMBIO 120B) are designed to have complementary content and offer a variety of perspectives on the Health Care System. Upper division course with preference given to upperclassmen. Prerequisites: Human Biology Core or equivalent, or consent of instructor.

## **HUMBIO 120A. American Health Policy. 3 Units.**

This course addresses current issues in health care reform and the policy making process. Covers current policy options for improving the health care system, as well as differing policy perspectives among those with different political views. Explores current controversies over attempts to modify the Affordable Care Act. Students discuss the feasibility, options, and ramifications of alternative proposals for health care reform. Involves student presentations, followed by discussion. Note: HUMBIO courses in the 120s (specifically HUMBIO 120, HUMBIO 120A, HUMBIO 120B) are designed to have complementary content and offer a variety of perspectives on the Health Care System. Prerequisites: Human Biology Core or equivalent, Human Biology 120, or consent of instructor.

## **HUMBIO 120B. The American Health Care System and Health Policy. 4 Units.**

In this course you will learn about the structure and functioning of the U.S. health care system. The health care system in the U.S. has been challenged by high and rising costs, a failure to ensure universal access to care, and a need to ensure the quality of care provided to patients. We will explore in depth how our health care system works, how its structure and function contributes to the challenges we are confronting, and explore changes to the healthcare system that could help address them. The course has two main parts, the first focused on health insurance and health care financing, and the second focused on health care providers like doctors and hospitals. In addition, we bring other important topics like the Affordable Care Act, pharmaceuticals and health reforms. Note: HUMBIO courses in the 120s (specifically HUMBIO 120, HUMBIO 120A, HUMBIO 120B) are designed to have complementary content and offer a variety of perspectives on the Health Care System. Recommended Prerequisites: Human Biology Core.

**HUMBIO 121E. Ethnicity and Medicine. 1-3 Unit.**

Weekly lecture series. Examines the linguistic, social class, and cultural factors that impact patient care. Presentations promote culturally sensitive health care services and review contemporary research issues involving minority and underserved populations. Topics include health care inequities and medical practices of African Americans, Asians, Latinos, Native Americans, immigrants, and refugees in both urban and rural settings. 1 unit requires weekly lecture attendance, completion of required readings, completion of response questions; 2 units requires weekly lecture attendance and discussion session, completion of required readings and weekly response questions; 3 units (HUMBIO only) requires completion of a significant term paper. Students must enroll in HUMBIO 121E for 3 units to receive a letter grade. This course must be taken for a minimum of 3 units to be eligible for Ways credit. Enrollment limited to students with sophomore academic standing or above. Same as: EMED 121E

**HUMBIO 122. Beyond Health Care: the effects of social policies on health. 3 Units.**

(HUMBIO students must enroll in HUMBIO 122. Med/Graduate students must enroll in PEDS 222.) Available evidence at the national and cross-country level linking social welfare interventions and health outcomes. If and how non-health programs and policies could have an impact on positive health outcomes. Evaluation of social programs and policies that buffer the negative health impact of economic instability and unemployment among adult workers and their children. Examination of safety nets, including public health insurance, income maintenance programs, and disability insurance. Open to both undergraduate and graduate students. Prerequisites: HUMBIO 3B or equivalent, and some background in research methods and statistics, or consent of instructor. Same as: PEDS 222

**HUMBIO 122A. Health Care Policy and Reform. 5 Units.**

(HUMBIO students must enroll in HUMBIO 122A. Graduate students must enroll in PUBLPOL 156.) Focuses on U.S. health care policy. Includes comparisons with health care policy in other countries and detailed examinations of Medicare, Medicaid, private insurance, the Affordable Care Act (ACA), and proposed reforms. Examines health policy efforts at state, local, and local levels. The course includes sessions on effective memo writing as well as presentation and the politics of health policy and reform efforts. Enrollment limited to students with sophomore academic standing or above. Prerequisites: Human Biology Core. Same as: PUBLPOL 156

**HUMBIO 122E. Reducing Health Disparities and Closing the Achievement Gap through Health Integration in Schools. 3 Units.**

(HUMBIO students must enroll in HUMBIO 122E. Med/Graduate students must enroll in PEDS 229.) Health and education are inextricably linked. If kids aren't healthy, they won't realize their full potential in school. This is especially true for children living in poverty. This course proposes to: 1) examine the important relationship between children's health and their ability to learn in school as a way to reduce health disparities; 2) discuss pioneering efforts to identify and address manageable health barriers to learning by integrating health and education in school environments. Same as: EDUC 429, PEDS 229

**HUMBIO 122M. Challenges of Human Migration: Health and Health Care of Migrants and Autochthonous Populations. 3 Units.**

(HUMBIO students must enroll in HUMBIO 122M. Med/Graduate students enroll in PEDS 212) An emerging area of inquiry. Topics include: global migration trends, health issues/aspects of migration, healthcare and the needs of immigrants in the US, and migrants as healthcare providers: a new area of inquiry in the US. Class is structured to include: lectures lead by the instructor and possible guest speakers; seminar, discussion and case study sessions led by students. Upper division course with preference given to upperclassmen. Same as: PEDS 212

**HUMBIO 122S. Social Class, Race, Ethnicity, and Health. 4 Units.**

Examines health disparities in the U.S., looking at the patterns of those disparities and their root causes. Explores the intersection of lower social class and ethnic minority status in affecting health status and access to health care. Compares social and biological conceptualizations of race and ethnicity. Upper division course with preference given to upperclassmen. Prerequisite: Human Biology Core or Biology Foundations.

Same as: AFRICAAM 132, CSRE 122S

**HUMBIO 123E. Health Economics & Policy: exploring health disparities, child health & health care spending. 4 Units.**

This course addresses issues related to population health, health care, and health policy using tools from empirical and theoretical economics. We will study topics such as the demand for health care, socioeconomic disparities in population health outcomes, health insurance design, the role of competition in health care markets, determinants of health care spending, technological change in the health care sector, and pharmaceuticals and the opioid crisis. Throughout the course, we will learn about research methodology that will help us to distinguish correlation from causation, and think critically about the role of the government and public policy. The course will feature concepts from microeconomic theory, statistics, and econometrics. Prerequisites: Human Biology Core or equivalent, and statistics requirements.

**HUMBIO 124C. Global Child Health. 3-5 Units.**

(HUMBIO students must enroll in HUMBIO 124C. Med/Graduate students must enroll in MED 124 or PEDS 124.) This course introduces students to key challenges to the health and well being of children worldwide. We explicitly focus on child and public health problems in low- and middle-income countries (LMIC) to reflect the global burden of disease among children. We will review the scope and magnitude of the leading causes of morbidity and mortality, as well as examine regional variations. We will then identify both medical and non-medical causes, effects of, as well as interventions to address, some of the biggest child health problems. The course will also present an overview of the role of culture, gender, and non-state actors (NGOs, foundations, etc.) on health and health policy. Optional: The course will be taught in conjunction with an optional two-unit community engaged learning component. Please view the course syllabus for more information. Upper division course with preference given to upperclassmen. Prerequisites: Human Biology Core or equivalent or Biology Foundations.

Same as: MED 124, PEDS 124

**HUMBIO 125. Current Topics and Controversies in Women's Health. 2-3 Units.**

(HUMBIO students must enroll in HUMBIO 125. PhD minor in FGSS must enroll in FEMGEN 256. Med students must enroll in OBGYN 256.) Interdisciplinary. Focus is primarily on the U.S., with selected global women's health topics. Topics include: leading causes of morbidity and mortality across the life course; reproductive (e.g. gynecologic & obstetric) health issues; sexual function; importance of lifestyle (e.g. diet, exercise, weight control), including eating disorders; mental health; sexual and relationship abuse; issues for special populations. In-class Student Debates on key controversies in women's health. Guest lecturers. Undergraduates must enroll for 3 units. PhD minor in FGSS should enroll for 2 - 3 units. Med students should enroll for 2 units. To receive a letter grade in any listing, students must enroll for 3 units. This course must be taken for a letter grade and a minimum of 3 units to be eligible for Ways credit. Enrollment limited to students with sophomore academic standing or above. Undergraduate prerequisite: Human Biology Core or Biology Foundations or equivalent or consent of instructor.

Same as: FEMGEN 256, OBGYN 256

**HUMBIO 126. Promoting Health Over the Life Course: the Science of Healthy Living. 3 Units.**

(HUMBIO students must enroll in HUMBIO 126. Med/Graduate students must enroll in CHPR 226.) Disease prevention and health promotion topics pertinent at different stages of the life span emphasizing healthy lifestyle and reducing risk factors in both individuals and communities. Focus is on the application of behavioral science to risk reduction strategies, and the importance of health promotion as a social and economic imperative. Public and community health are emphasized. Topics include: epidemiology of chronic diseases; social determinants of health, behavior change; physical activity, nutrition, obesity and stress reduction; children, young adult, mid-life and aging health issues; health care delivery and public health system; workplace wellness; and other additional issues. Students enrolled in CHPR 226 for a letter grade must complete additional assignments appropriate for its Masters level listing. Enrollment limited to students with sophomore academic standing or above. Undergraduate prerequisites: Human Biology Core or equivalent or consent of instructor.  
Same as: CHPR 226

**HUMBIO 128. Community Health Psychology. 4 Units.**

Social ecological perspective on health emphasizing how individual health behavior is shaped by social forces. Topics include: biobehavioral factors in health; health behavior change; community health promotion; and psychological aspects of illness, patient care, and chronic disease management. Prerequisites: HUMBIO 3B or PSYCH 1 or equivalent.  
Same as: PSYCH 101

**HUMBIO 128D. Systems Design In Health. 3 Units.**

Good health doesn't begin the minute someone walks into a doctor's office; it begins in the places where we live, learn, work, and play. The products, services, and environments that we encounter everyday have a tremendous impact on our health. Taking a systems design-led approach developed at IDEO, we will explore public health in the context of culture, business, and design. The course will encourage students to integrate their personal perspectives with a systems-level view, paying particular attention to health equity and the role of creative leadership. Assignments will be a blend of reading and design exercises.

**HUMBIO 129S. Global Public Health. 3 Units.**

The class is an introduction to the fields of international public health and global medicine. It focuses on resource poor areas of the world and explores major global health problems and their relation to policy, economic development, culture and human rights. We discuss technical solutions as well as the importance of the social determinants of health, and emphasize multi-sectoral approaches to care. The course is intended to challenge all students to think globally, and is geared for students interested in exploring how their major interests could be directed to solve global health issues. We provide opportunities for in-depth discussion and interaction with experts in the field. This course must be taken for a letter grade to be eligible for Ways credit.

**HUMBIO 129W. Health Care Systems Around the World. 4 Units.**

This course will explore the role of health care systems in societies around the world, identifying the common challenges facing health care systems and how different institutional structures in different countries perform in response to these challenges. We will structure the course around general conceptual frameworks related to key health system institutions (including financing, insurance, provider payment, patient cost-sharing, and the regulation of medical technology). From this foundation, we will draw on the experience of individual countries (high and low income, with heavy chronic disease and infectious disease burdens) to illustrate the function of these institutions under real-world circumstances observed around the globe. Prerequisite: Human Biology Core or Biology Foundations or equivalent or consent of instructor.  
Same as: MED 129

**HUMBIO 130. Human Nutrition. 4 Units.**

(HUMBIO students must enroll in HUMBIO 130. CHPR master's students must enroll in CHPR 130.) The study of food, and the nutrients and substances therein. Their action, interaction, and balance in relation to health and disease. Emphasis is on the biological, chemical, and physiological processes by which humans ingest, digest, absorb, transport, utilize, and excrete food. Dietary composition and individual choices are discussed in relationship to the food supply, and to population and cultural, race, ethnic, religious, and social economic diversity. The relationships between nutrition and disease; ethnic diets; vegetarianism; nutritional deficiencies; nutritional supplementation; phytochemicals. CHPR master's students must enroll for a letter grade. Enrollment limited to students with sophomore academic standing or above. Prerequisites: Human Biology Core or Biology Foundations or consent of instructor.  
Same as: CHPR 130

**HUMBIO 131. Kinesiology. 4 Units.**

This course covers the basic principles governing human movement with an emphasis on sports applications. The course spends roughly equal amounts of time on the applied anatomy and biology, meaning both the large and small-scale body structure and function. The applied anatomy portion includes body structure (the muscles and their connections) and mechanics (e.g. forces, torque, momentum and power), which together describe macroscopic movement. The applied biology portion includes the molecular and cellular basis of movement, mainly muscle contraction, nerve signaling, and the mechanisms of exercise damage, cramping, muscle memory, delayed-onset muscle soreness, and fatigue. Enrollment limited to students with sophomore academic standing or above. Prerequisites: Human Biology Core or Biology Foundations or equivalent or consent of instructor.

**HUMBIO 133. Human Physiology. 4 Units.**

Human physiology will be examined by organ systems: cardiovascular, respiratory, renal, gastrointestinal and endocrine. Molecular and cell biology and signaling principles that underlie organ development, pathophysiology and opportunities for regenerative medicine are discussed, as well as integrative control mechanisms and fetal development. Prerequisite: Human Biology core or Biology Foundations or equivalent or consent of instructor.  
Same as: BIO 112

**HUMBIO 135. Exercise Physiology. 4 Units.**

Explore the amazing capacity of your body to move and adapt within your everyday world. You will learn: how your body systems respond to the stress of acute exercise and adapt to chronic exercise training, how your cardiovascular system adapts to optimize oxygen delivery and utilization, how your muscles generate force and hypertrophy in response to training, and how your metabolic/biochemical pathways are regulated to support the increased energy demand of exercise. We will discuss theories on the causes of fatigue and muscle soreness, and on what limits human performance. Applied topics such as the effects of aging, gender, and environmental conditions (high altitude, heat, cold, microgravity) on your body will be emphasized in the second half of the course. Portions of the class will be taught through videos that use online lectures and engaging stories to illustrate physiology concepts. Enrollment limited to students with sophomore academic standing or above. Prerequisites: Human Biology core or Biology Foundations or equivalent, or consent of instructor.

**HUMBIO 135S. Body Hacking: Applied Topics in Exercise Physiology. 3 Units.**

Our increasing understanding of exercise physiology and biochemistry provide new insights into how we can "hack" the human body to increase the response to exercise training and improve human performance and health. In this discussion based course, we will explore research and training interventions that try to capitalize on this new knowledge. Science communication will also be emphasized in the class, so students will learn the fundamentals of science storytelling and mixed media presentation of ideas. Requirements of this class include participating in blogs & in-class discussions, evaluating physiology research, writing a research paper, and creating a science-based story by video or podcast to share with the class. If class is full, contact instructor for an application. Enrollment limited to 10. Prerequisites: B+ or higher in HUMBIO 135 and/or consent of instructor.

**HUMBIO 139S. Sport and Exercise Medicine. 3 Units.**

This is an upper division course with a common theme of injury as well as injury prevention in sport and physical activity. The topics include the treatment and evaluation of common sports injuries and illnesses for both musculoskeletal and non-musculoskeletal/medical conditions. Students will also develop critical reading and thinking skills. Classes will incorporate didactic lectures, critical analysis of sports medicine literature, as well as hand-on labs incorporating current sports medicine injury evaluation tools. Enrollment limited to students with sophomore academic standing or above. Prerequisite: Human Biology Core or Biology Foundations or equivalent or consent of instructor.

**HUMBIO 14. Understanding Connections between Food and the Environment. 1 Unit.**

Globally, food systems, what we eat, where and how we grow it, play a major role in determining our impact on the environment. By considering our food choices, we can find "low hanging vegetables" for reducing our "foodprint". In this course, we will begin to explore the complex connections between food and the environment. We will begin with a discussion of "Planetary Boundaries" as a guide for understanding the limits for human alterations of the biosphere, beyond which abrupt changes could occur. We will then introduce nine topics which will be discussed in the nine weeks to follow, and how they relate to food.

**HUMBIO 140. Sex and Gender in Human Physiology and Disease. 2-3 Units.**

(HUMBIO students must enroll in HUMBIO 140. PhD minor in FGSS must enroll in FEMGEN 241. Med students must enroll in MED 240.) Chromosomal, hormonal and environmental influences that lead to male and female and intersex reproductive anatomy and physiology and neuroendocrine regulation. Masculinizing and feminizing effects of endogenous and exogenous sex hormones and sociocultural factors, in particular gender identity, (social) gender norms and relationships, on the musculoskeletal, neurological, cardiovascular, immunological and other systems and tissues, e.g. adipose, skin, etc. over the lifecourse, from conception to puberty, through reproductive phases (including changes during the menstrual cycle and pregnancy up to and beyond menopause in women, and with aging in both sexes). Transgender health issues. Guest lecturers. Enrollment limited to students with sophomore academic standing or above. Prerequisites: Human Biology Core or Biology Foundations or equivalent, or consent of instructor. Same as: FEMGEN 241, MED 240

**HUMBIO 142. Adolescent Development. 4 Units.**

Underlying changes and their consequences in everyday functioning. Physical, cognitive, social, and sexual development; how these changes influence the emerging sense of identity, autonomy, and intimacy. Contexts in which adolescents move such as family, friends and peers, school, and workplace. Focus is on normal development of boys and girls; attention to problem outcomes including eating disorders, depression, and teen pregnancy. Prerequisites: HUMBIO 4B or PSYCH 1 or consent of instructor.

**HUMBIO 142M. Special Topics in Adolescent Mental Health. 4 Units.**

Includes the study of aspects of common disorders seen in adolescent populations, such as prevalence, developmental course, gender differences, theoretical explanations, and therapeutic interventions. Topics will include mood/anxiety disorders, eating disorders, learning disabilities and ADHD, sexual risk behaviors, developmental disorders, substance abuse, and self-harm. Goals of this course include getting students to think critically about the unique mental health needs of adolescents, collaborating on devising ways to improve the way our society meets those needs, and strengthening writing and communication skills applicable to this area of inquiry. Enrollment limited to students with sophomore academic standing or above. Prerequisites: Human Biology Core or Biology Foundations or equivalent or consent of instructor. Same as: PSYCH 142A

**HUMBIO 143. Adolescent Sexuality. 4 Units.**

Developmental perspective. Issues related to scientific, historical, and cultural perceptions; social influences on sexual development; sexual risk; and the limitations and future directions of research. Sexual identity and behavior, sexually transmitted diseases including HIV, pregnancy, abortion, gay and lesbian youth, sex education and condom availability in schools, mass media, exploitative sexual activity, and difficulties and limitations in studying adolescent sexuality. Legal and policy issues, gender differences, and international and historical trends. Prerequisites: Human Biology core or Biology Foundations or equivalent, or consent of instructor.

**HUMBIO 144. Boys' Psychosocial Development. 4 Units.**

Focuses on early childhood through young adulthood. Examines boys' lives and experiences as embedded within interpersonal relationships as well as social and cultural contexts. Includes perspectives from psychology, sociology, gender studies, and education. Upper division course with preference given to upperclassmen. Prerequisites: Human Biology Core or Developmental Psychology Biology Foundations or consent of instructor.

**HUMBIO 146. Culture and Madness: Anthropological and Psychiatric Approaches to Mental Illness. 3-5 Units.**

Unusual mental phenomena have existed throughout history and across cultures. Taught by an anthropologist and psychiatrist, this course explores how different societies construct the notions of "madness": What are the boundaries between "normal" and "abnormal", reason and unreason, mind and body, diversity and disease? Optional: The course will be taught in conjunction with an optional two-unit discussion section. Same as: ANTHRO 186, ANTHRO 286, PSYC 286

**HUMBIO 149. Psychological and Educational Resilience Among Children and Youth. 4-5 Units.**

Theoretical, methodological, and empirical issues pertaining to the psychological and educational resilience of children and adolescents. Overview of the resilience framework, including current terminology and conceptual and measurement issues. Adaptive systems that enable some children to achieve successful adaptation despite high levels of adversity exposure. How resilience can be studied across multiple levels of analysis, ranging from cell to society. Individual, family, school, and community risk and protective factors that influence children's development and adaptation. Intervention programs designed to foster resilient adaptation in disadvantaged children's populations. Same as: EDUC 256

**HUMBIO 149L. Longevity. 4 Units.**

Interdisciplinary. Challenges to and solutions for the young from increased human life expectancy: health care, financial markets, families, work, and politics. Guest lectures from engineers, economists, geneticists, and physiologists. Same as: NENS 202, PSYCH 102



**HUMBIO 151R. Biology, Health and Big Data. 3 Units.**

We are living in the midst of a revolution in the accessibility and availability of biological and medical data. How can all this data be used to improve human health? In this course, students will look at case studies from diabetes and cancer research to learn how to access publicly available data ranging from gene or protein level datasets to information about clinical trials. Students will apply what they learn from the case studies to develop a research proposal and presentation on a biology-related topic of their choice. The class will have a small group workshop-type format. Students will gain skills in research methods including accessing, analyzing and presenting data. There will be exercises using the R programming language. Prior programming experience is not required. nPrerequisites: HUMBIO 2A and HUMBIO 3A or BIO 82 and BIO 83 or consent of instructor.

**HUMBIO 153. Parasites and Pestilence: Infectious Public Health Challenges. 4 Units.**

We will learn about parasitic and other pestilence of public health importance and how they affect billions of people worldwide. We examine the pathogenesis, clinical syndromes, complex life cycles, and the interplay among environment, vectors, hosts, and reservoirs; we explore historical contexts as it informs current interventions and programming against disease. Public health policy initiatives aimed at halting disease transmission are viewed critically through the lens of researchers, public health level initiatives, popular media (TV and movies) and individual patients with these diseases. There will be guest visitors who have experienced these diseases and we will hear from several researchers and experts working on the challenges of controlling, eliminating or even eradicating these diseases. We will become familiar with the targeted diseases of the World Health Organization tropical disease research list, including river blindness, sleeping sickness, leishmaniasis, schistosomiasis, mycobacterial disease (tuberculosis and leprosy), malaria, toxoplasmosis, dracunculiasis, and intestinal helminthes. There will be a lab section for "hands on" learning and viewing of parasites. Interactive sessions will involve teaching each other about these biological forces of nature that invade humans. Prerequisites: Human Biology Core or Biology Foundations or equivalent or consent of instructor.

**HUMBIO 154B. Principles of Epidemiology. 3 Units.**

Epidemiology is the study of the distribution and determinants of health and disease in human populations. In this course, students will learn about design, measures of disease occurrence and measures of association between exposures - be they environmental, behavioral or genetic - and health outcomes of interest. Students will also learn about how error, confounding and bias can impact epidemiological results. The course draws on both classic and contemporary research articles, which students will learn to critically appraise. Through lectures, problem sets, written responses to original articles and in-class discussions, students will gain a solid foundation in epidemiology. HUMBIO 154 courses can be taken separately or as a series. Upper division course with preference given to upperclassmen. Prerequisites: Human Biology Core or Biology Foundations or consent of instructor.

**HUMBIO 154C. Cancer Epidemiology. 4 Units.**

Clinical epidemiological methods relevant to human research in cancer will be the focus. The concepts of risk; case control, cohort, and cross-sectional studies; clinical trials; bias; confounding; interaction; screening; and causal inference will be introduced and applied. Social, political, economic, and ethical controversies surrounding cancer screening, prevention, and research will be considered. HUMBIO 154 courses can be taken separately or as a series. Enrollment limited to students with sophomore academic standing or above. Prerequisites: Human Biology core or Biology Foundations or equivalent, or instructor consent.

**HUMBIO 154D. Models for Understanding and Controlling Global Infectious Diseases. 3-4 Units.**

(HUMBIO students must enroll in HUMBIO 154D. Med/Graduate students must enroll in HRP 204.) This course introduces students to the dynamics of infectious diseases of global health importance, focusing on the use of mathematical models to characterize their transmission in populations. Relevant case examples of pathogens with differing natural history and transmission routes include tuberculosis, HIV, malaria, typhoid, and cholera, as well emerging infectious diseases such as Ebola and the 2019 novel coronavirus. Lectures will emphasize the theoretical basis underlying infectious disease dynamics and link them to in-class workshops and problem sets that will emphasize public health applications and will provide students with hands-on experience in creating and coding models. Students will learn the mathematical underpinnings of key topics in infectious disease transmission including herd immunity, the basic reproductive number, vaccine effects, social contact structure, host heterogeneities, and pathogen fitness. The course will teach students how to approach new questions in infectious disease transmission, from model selection, tradeoffs in model complexity or parsimony, parameterization, sensitivity and uncertainty analyses. Students will practice building models, evaluating the influence of model parameters, making predictions about disease trajectories, and projecting the impact of public health interventions. Prerequisites: HUMBIO 88 or 89 or STATS 141 or BIOSCI 141.

Same as: HRP 204

**HUMBIO 158. Building Blocks for Chronic Disease. 3 Units.**

Researchers have come a long way in developing therapies for chronic disease but a gap remains between current solutions and the ability to address the disease in full. This course provides an overview to the underlying biology of many of these diseases and how they may connect to each other. A "think outside of the box" approach to drug discovery is needed to bridge such a gap in solutions, and this course teaches the building blocks for that approach. Could Legoland provide the answer? This is a guest lecture series with original contributions from prominent thought leaders in academia and industry. Interaction between students and guest lecturers is expected. Students with a major, minor or coterm in Biology: 109A/209A or 109B/209B may count toward degree program but not both.

Same as: BIO 109A, BIOC 109A, BIOC 209A

**HUMBIO 159. Genes and Environment in Disease Causation: Implications for Medicine and Public Health. 2-3 Units.**

(Formerly HRP 238) The historical, contemporary, and future research and practice among genetics, epidemiology, clinical medicine, and public health as a source of insight for medicine and public health. Genetic and environmental contributions to multifactorial diseases; multidisciplinary approach to enhancing detection and diagnosis. The impact of the Human Genome Project on analysis of cardiovascular and neurological diseases, and cancer. Ethical and social issues in the use of genetic information. This course must be taken for a minimum of 3 units and a letter grade to be eligible for Ways credit. In academic year 2020-21, a letter grade or a CR grade will satisfy the Ways requirement. Prerequisites: Human Biology core or Biology Foundations or consent of instructor.

Same as: EPI 238

**HUMBIO 160. Human Behavioral Biology. 5 Units.**

Multidisciplinary. How to approach complex normal and abnormal behaviors through biology. How to integrate disciplines including sociobiology, ethology, neuroscience, and endocrinology to examine behaviors such as aggression, sexual behavior, language use, and mental illness.

Same as: BIO 150

**HUMBIO 161. The Neurobiology of Sleep. 4 Units.**

The neurochemistry and neurophysiology of changes in brain activity and conscious awareness associated with changes in the sleep/wake state. Behavioral and neurobiological phenomena including sleep regulation, sleep homeostasis, circadian rhythms, sleep disorders, sleep function, and the molecular biology of sleep. Preference to seniors and graduate students. Enrollment limited to 16.

Same as: BIO 149, BIO 249

**HUMBIO 162L. The Literature of Psychosis. 3-5 Units.**

One of the great gifts of literature is its ability to give us insight into the internal worlds of others. This is particularly true of that state clinicians call "psychosis." But psychosis is a complex concept. It can be terrifying and devastating for patients and families, and yet shares characteristics with other, less pathological states, such as mysticism and creativity. How then can we begin to make sense of it? In this course, we will examine the first-hand experience of psychosis. We will approach it from multiple perspectives, including clinical descriptions, works of art, and texts by writers ranging from Shakespeare, to the science fiction writer Philip K. Dick, to patients attempting to describe their experience. This class is not only for students thinking of careers in medicine, psychology or anthropology, but also readers and writers interested exploring extraordinary texts. There are no prerequisites necessary; all that is needed is a love of language and a curiosity about the secrets of other minds.

Same as: ANTHRO 82P, PSYC 82, PSYC 282

**HUMBIO 163. The Opioid Epidemic: Using Neuroscience to Inform Policy and Law. 3 Units.**

The opioid epidemic has become a national problem, killing 115 people per day in the United States, and contributing to the first decrease in life expectancy in this country for decades. This is an upper division undergraduate class that aims to help students understand the science of opiates, how opioid prescribing and availability led us to be in this place, and how that information might be used to create effective policy to reverse it. Students will engage didactic work and interactive discussions to stimulate critical thinking at the interface between psychology, psychiatry, addiction medicine, neuroscience, communication, law, and society. They will develop the knowledge-base and framework to critically evaluate the science behind opioid addiction and how to apply this knowledge to address the addiction epidemic. This highly interactive seminar aims to engage the students in critical thinking didactics, activities and discussions that shape their understanding of the complexity inherent to the issues surrounding addiction and increase the student's ability to more critically assimilate and interrogate information. Preference will be given to upperclassmen, especially in the HumBio program. Attendance at first class is mandatory. Enrollment limited to 20 by application only. Applications will be accepted on Sunday, February 28th at midnight, consistent with the Spring Quarter enrollment. Applications will be due on Friday, March 5th at 5:00PM. Applications will be considered in the order received. Apply here: <https://app.smartsheet.com/b/form/615264add6dc475da6da583f9a41a4b0>. Prerequisites: Human Biology Core or PSYC 83 or consent of instructor.

**HUMBIO 164. Autism Spectrum Disorder. 3 Units.**

Deficits in social communication and interaction and repetitive behaviors are the core symptoms of Autism Spectrum Disorder (ASD), a neurodevelopmental disorder that affects about 1% of all children and costs society an estimated \$268B annually. This interactive seminar course will provide an overview of our understanding of ASD, from genetics through epidemiology, biology and treatment, and the many implications for society, including the principles and problems of diagnosis, its impact upon family and across the lifespan, and controversies regarding its etiology, perception and care. Preference will be given to upperclassmen, especially in the Human Biology program. Attendance at first class is mandatory. Enrollment is limited to 18 students by application only. Applications will be accepted on Tuesday, September 1st at midnight, consistent with the Autumn Quarter enrollment. Application is closed. Prerequisites: Human Biology core or BIO 82 and BIO 84 or consent of instructor.

**HUMBIO 166. Food and Society: Exploring Eating Behaviors in Social, Environmental, and Policy Context. 4 Units.**

(HUMBIO students must enroll in HUMBIO 166. Med/Graduate students must enroll in CHRP 166.) The material in this course is an introduction to the field and the target audience is undergraduates. It may be of interest to graduate students unfamiliar with the field. The class examines the array of forces that affect the foods human beings eat, and when, where, and how we eat them, including human labor, agriculture, environmental sustainability, politics, animal rights/welfare, ethics, policy, culture, economics, business, law, trade, and ideology, and psychology. The class addresses the impact of current policies and actions that might be taken to improve human nutrition and health; macro-scale influences on food, nutrition, and eating behavior. Enrollment limited to students with sophomore academic standing or above. Undergraduate Prerequisites: Human Biology Core or Biology Foundations or consent of instructor. Same as: CHPR 166

**HUMBIO 168. Multidisciplinary Perspectives on Guilt. 3 Units.**

The seminar encompasses the personal and cultural components of guilt from multidisciplinary perspectives. At the individual level, it explores behaviors that induce guilt; their relational aspects; genesis in evolutionary and developmental terms; and its normal and pathological manifestations. The cultural section includes cross-cultural perspectives on guilt and its conceptions in Christianity, Judaism, Islam, Hinduism, Buddhism, and Confucianism; as well as in the philosophy of Aristotle, Kant, J. S Mill and Nietzsche, and culpability in the law. Derived from this material, the course will also focus on the nature of ethical reasoning and the ways we make ethical choices and judgments in our lives. Upper division course with preference given to upperclassmen.

**HUMBIO 171. The Death Penalty: Human Biology, Law, and Policy. 3 Units.**

Combines academic study with student participation in forensic research and case investigation, including DNA evidence, psychological and physiological development, mental and physical disabilities, and witness interviews. The philosophy, structure, and application of capital punishment in the U.S. Goal is to examine and challenge the issues involved in the death penalty from the perspective of involvement in a real case. Course not taught from a preconceived belief or political or philosophical agenda except to involve students in an intellectual challenge of policy and philosophy. Upper division course with preference given to upperclassmen.

**HUMBIO 172B. Children, Youth, and the Law. 3 Units.**

How the legal rights of children and adolescents in America are defined, protected, and enforced through the legal process within the context of their developmental needs and competing societal interests. Topics: origins and definitions of children's rights; adoption; custody; the juvenile justice system; education; freedom of speech; and sex. The class is interactive, using hypotheticals for discussion and analysis. A and B alternate; students may take one or both. Upper division course with preference given to upperclassmen. Same as: PUBLPOL 172

**HUMBIO 174. Foundations of Bioethics. 3 Units.**

Classic articles, legal cases, and foundational concepts. Theoretical approaches derived from philosophy. The ethics of medicine and research on human subjects, assisted reproductive technologies, genetics, cloning, and stem cell research. Ethical issues at the end of life. Upper division course with preference given to upperclassmen.

**HUMBIO 174A. Ethics in a Human Life. 4 Units.**

Ethical questions pervade a human life from before a person is conceived until after she dies, and at every point in between. This course raises a series of ethical questions, following along the path of a person's life - questions that arise before, during, and after she lives it. We will explore distinctive questions that a life presents at each of several familiar stages: prior to birth, childhood, adulthood, death, and even beyond. We will consider how some philosophers have tried to answer these questions, and we will think about how answering them might help us form a better understanding of the ethical shape of a human life as a whole.

Same as: ETHICSOC 174, PHIL 74A

**HUMBIO 176A. Medical Anthropology. 5 Units.**

Emphasis is on how health, illness, and healing are understood, experienced, and constructed in social, cultural, and historical contexts. Topics: biopower and body politics, gender and reproductive technologies, illness experiences, medical diversity and social suffering, and the interface between medicine and science.

Same as: ANTHRO 82, ANTHRO 282

**HUMBIO 177. Disability Literature. 3-5 Units.**

This course explores literary and filmic narratives about disability in the Global South. Authors including Edwidge Danticat, Bapsi Sidhwa, and Ricardo Padilla highlight the unique aesthetic potential of what Michael Davidson calls the defamiliar body and Ato Quayson describes as aesthetic nervousness. While engaging universal issues of disability stigma, they also emphasize the specific geopolitics of disability and how people in the Global South face greater rates of impairment based on unequal exposure to embodied risk. The course particularly welcomes students with interests in fields of medicine, policy, or public health.

**HUMBIO 178A. Intro to Disability Studies: Disability and Technology. 5 Units.**

For a long time, disability studies has focused on the past, early representations of people with disabilities and histories of the movement for disability rights. This course turns toward the future, looking at activism and speculative fiction as critical vehicles for change. Drawing on fiction by Samuel Beckett, Muriel Rukeyser, and Octavia Butler, this course will address the question of the future through an interrogation of the relationship between disability and technology, including assistive technology, genetic testing, organ transplantation.

**HUMBIO 179B. Music and Healing. 3 Units.**

To what extent can sound or music heal? This interdisciplinary course asks questions about music and healing around the world, drawing on the fields of medical ethnomusicology, medical anthropology, sound studies, and music therapy. Our case studies will be multi-sited, as we interrogate sound-based healings and healing sounds from diverse cross-cultural, global, and historic perspectives. No musical background is needed to interrogate these issues. We begin with the knowledge that the social, cultural, and political contexts where definitions of music and healing are created inform sound and its various and often conflicting interpretations and meanings.

Same as: MUSIC 39B

**HUMBIO 180. Human Skeletal Anatomy. 5 Units.**

Study of the human skeleton (a. k. a. human osteology), as it bears on other disciplines, including medicine, forensics, archaeology, and paleoanthropology (human evolution). Basic bone biology, anatomy, and development, emphasizing hands-on examination and identification of human skeletal parts, their implications for determining an individual's age, sex, geographic origin, and health status, and for the evolutionary history of our species. Three hours of lecture and at least three hours of supervised and independent study in the lab each week.

Same as: ANTHRO 175, ANTHRO 275, BIO 174, BIO 274

**HUMBIO 191. Human Biology Practicum. 1 Unit.**

Restricted to Human Biology majors. For students who have undertaken supervised community-engaged service, research (e.g. HB-REX, Bio-X) or pre-professional experiences related to their Area of Concentration topic. Includes a series of six required elements done throughout Junior and Senior year. Enroll for 1 unit during your final undergraduate quarter, typically Senior Spring; contact Capstone Coordinator for exceptions. Satisfies the Capstone Requirement of the major.

**HUMBIO 192A. Human Biology Synthesis. 2-3 Units.**

Capstone course series for HUMBIO seniors. Expands the work of the student's Area of Concentration. The Synthesis allows students the opportunity to craft a culminating, creative work of scholarship based on a synthesis of personal and academic interests, including service projects. Students should begin their synthesis either in the third quarter of Junior year or the first quarter of Senior year. Participation in the HUMBIO Senior Symposium during Spring quarter is required. Students should enroll in either 3 units for two quarters or 2 units for three quarters. Prerequisite: acceptance into the synthesis program: <https://humanbiology.stanford.edu/capstone/synthesis>. Notes: Contact Samantha Cooper for Department Consent.

**HUMBIO 192S. Human Biology Synthesis. 1-3 Unit.**

Capstone course series for HUMBIO seniors. Expands the work of the student's Area of Concentration. The Synthesis allows students the opportunity to craft a culminating, creative work of scholarship based on a synthesis of personal and academic interests, including service projects. Students should begin their synthesis either in the third quarter of Junior year or the first quarter of Senior year. Participation in the HUMBIO Senior Symposium during Spring quarter is required. Students should enroll in either 3 units for two quarters or 2 units for three quarters. Prerequisite: acceptance into the synthesis program: <https://humanbiology.stanford.edu/capstone/synthesis>. Notes: Contact Samantha Cooper for Department Consent.

**HUMBIO 192W. Human Biology Synthesis. 2-3 Units.**

Capstone course series for HUMBIO seniors. Expands the work of the student's Area of Concentration. The Synthesis allows students the opportunity to craft a culminating, creative work of scholarship based on a synthesis of personal and academic interests, including service projects. Students should begin their synthesis either in the third quarter of Junior year or the first quarter of Senior year. Participation in the HUMBIO Senior Symposium during Spring quarter is required. Students should enroll in either 3 units for two quarters or 2 units for three quarters. Prerequisite: acceptance into the synthesis program: <https://humanbiology.stanford.edu/capstone/synthesis>. Notes: Contact Samantha Cooper for Department Consent.

**HUMBIO 193. Research in Human Biology. 1-5 Unit.**

Independent research conducted under faculty supervision, in junior or senior year, normally but not necessarily in pursuit of an honors project. May be taken for a maximum 3 quarters of credit. Prerequisite: Faculty approval; application available in student services office.

**HUMBIO 194. Honors. 1-10 Unit.**

Restricted to Human Biology majors. Completion of the honors project, normally taken in the student's final quarter. First component: the honors thesis, a final paper providing evidence of rigorous research, fully referenced, and written in an accepted scientific style. Second component: participation in the honors symposium, including a 10-minute oral presentation followed by a brief question and answer session. Prerequisites: HUMBIO 193 or HUMBIO 199 and acceptance into the honors program.

**HUMBIO 197. Human Biology Internship. 1-4 Unit.**

Limited to and required of Human Biology majors. A supervised field, community, or lab experience of student's choosing, pre-approved by Human Biology faculty and student advisers, and initiated at least three quarters prior to graduation. Participation in a poster session on the internship experience is required during the first quarter that the student is in residence at Stanford after completion of the internship. May be repeated for credit and a total of 4 units accumulatively. Prerequisites: Human Biology core.

**HUMBIO 198. Senior Tutorial in Human Biology. 1-5 Unit.**

Reading for Human Biology majors in exceptional circumstances and under sponsorship of Human Biology associated faculty. Students must apply through Human Biology student services before registering. Reading list, paper, and evaluation required. May be repeated for credit.

**HUMBIO 199. Directed Reading/Special Projects. 1-4 Unit.**

Human Biology majors must obtain a sponsor from the Human Biology associated faculty or the Academic Council. Non-majors and students who have not declared must obtain a sponsor only from the Human Biology associated faculty. Students must complete application in Student Services Office.

**HUMBIO 200. Teaching of Human Biology. 1-5 Unit.**

For upper division undergraduates and graduate students. Practical experience in teaching Human Biology or serving as an assistant in a lecture course. May be repeated for credit.

**HUMBIO 26. Designing Research-Based Interventions to Solve Global Health Problems. 3-4 Units.**

The excitement around social innovation and entrepreneurship has spawned numerous startups focused on tackling world problems, particularly in the fields of education and health. The best social ventures are launched with careful consideration paid to research, design, and efficacy. This course offers students insights into understanding how to effectively develop, evaluate, and scale social ventures. Using TeachAids (an award-winning nonprofit educational technology social venture used in 82 countries) as a primary case study, students will be given an in-depth look into how the entity was founded and scaled globally. Guest speakers will include world-class experts and entrepreneurs in Philanthropy, Medicine, Communications, Education, and Technology. Open to both undergraduate and graduate students.

Same as: AFRICAST 135, AFRICAST 235, EDUC 135, EDUC 335, EPI 235, MED 235

**HUMBIO 27. Traditional Chinese Medicine. 1 Unit.**

The philosophy and history behind traditional Chinese medicine. Concepts such as Qi, Yin/Yang, meridians, Chinese organs, and the 5 elements. How these concepts are applied through techniques such as acupuncture, herbal medicine, Qi gong, and massage. How traditional Chinese medicine is understood from a scientific standpoint. Political and socioeconomic implications. Observation of an acupuncturist. Readings on the integration of Eastern and Western medicine and on traditional Chinese medicine.

**HUMBIO 28. Health Impact of Sexual Assault and Relationship Abuse across the Lifecourse. 1-3 Unit.**

(Human Biology students must enroll in HUMBIO 28 or AFRICAAM 28. Med/Grad students should enroll in SOMGEN 237 for 1-3 units.) An overview of the acute and chronic physical and psychological health impact of sexual abuse through the perspective of survivors of childhood, adolescent, young and middle adult, and elder abuse, including special populations such as pregnant women, military and veterans, prison inmates, individuals with mental or physical impairments. Also addresses: race/ethnicity, gender identity, sexual orientation, and other demographic and societal factors, including issues specific to college culture. Professionals with expertise in sexual assault present behavioral and prevention efforts such as bystander intervention training, medical screening, counseling and other interventions to manage the emotional trauma of abuse. Undergraduates must enroll for 3 units. To receive a letter grade in any listing, students must enroll for 3 units. This course must be taken for a letter grade and a minimum of 3 units to be eligible for Ways credit.

Same as: AFRICAAM 28, FEMGEN 237, SOMGEN 237

**HUMBIO 29A. Well-Being in Immigrant Children & Youth: A Service Learning Course. 4 Units.**

This is an interdisciplinary course that will examine the dramatic demographic changes in American society that are challenging the institutions of our country, from health care and education to business and politics. This demographic transformation is occurring first in children and youth, and understanding how social institutions are responding to the needs of immigrant children and youth to support their well-being is the goal of this course.

Same as: CHILATST 177A, CSRE 177E, EDUC 177A

**HUMBIO 29G. Gender and Intersectionality in Global Health. 3 Units.**

Intersectional thinking is increasingly being applied to global health and other academic disciplines as a framework for understanding complex, and often seemingly intractable, challenges to health and well-being. This course explores how gender (e.g. male, female, trans\*, non-binary, etc) identity and relationships intersect with other social categorizations, including age and reproductive status (particularly for women), race/ethnicity, socioeconomic class, immigration status, educational attainment, to create systemic advantages or disadvantages that may explain and/or could address poor health outcomes within and across global communities. More specifically, we will focus on intersectional and biological frameworks in the context of cultural gender norms, to explore possible reasons for differences in incidence and prevalence of a wide range of health disparities worldwide. We will also use these frameworks to explore options for health improvement, in terms of both prevention and care/treatment.

**HUMBIO 2A. Genetics, Evolution, and Ecology. 5 Units.**

Introduction to the principles of classical and modern genetics, evolutionary theory, and ecology. Topics: micro- and macro-evolution, population and molecular genetics including personal genomics and CRISPR, biodiversity and ecology, emphasizing the genetics and ecology of the evolutionary process and applications to human populations. HUMBIO 2A and HUMBIO 2B are designed to be taken concurrently and exams for both sides may include material from joint module lectures. Concurrent enrollment is strongly encouraged and is necessary for majors in order to meet declaration deadlines. Please note that Human Biology majors are typically required to take the Human Biology Core Courses for a letter grade; however in academic year 20-21 majors may count courses taken for a letter grade or for Credit (CR).



**HUMBIO 2B. Culture, Evolution, and Society. 5 Units.**

Introduction to the evolutionary study of human diversity, the origins of social complexity, and the field of demography. Topics will include hominid evolution, population dynamics and the demographic transition, the impact of disease on societies, social theory, and patterns and consequences of inequality. HUMBIO2B, with HUMBIO3B and HUMBIO 4B, satisfies the Writing in the Major (WIM) requirement for students in Human Biology. HUMBIO 2A and HUMBIO 2B are designed to be taken concurrently and exams or quizzes for both sides may include material from joint module lectures. Concurrent enrollment is strongly encouraged and is necessary for majors in order to meet declaration deadlines. Please note that Human Biology majors are typically required to take the Human Biology Core Courses for a letter grade; however in academic year 20-21 majors may count courses taken for a letter grade or for Credit (CR).

**HUMBIO 3A. Cell and Developmental Biology. 5 Units.**

Principles of the biology of cells, embryonic development and pattern formation, biochemistry of energetics and metabolism, the nature of membranes and organelles, hormone action and signal transduction in normal and diseased states (diabetes, cancer, autoimmune diseases), stem cells and immunology. HUMBIO 3A and HUMBIO 3B are designed to be taken concurrently and exams for both sides may include material from joint module lectures. Concurrent enrollment is strongly encouraged and is necessary for majors in order to meet declaration deadlines. Please note that Human Biology majors are typically required to take the Human Biology Core Courses for a letter grade; however in academic year 20-21 majors may count courses taken for a letter grade or for Credit (CR). Prerequisite: college chemistry or completion of the HumBio Core on-line chemistry lecture series during the fall quarter.

**HUMBIO 3B. Environmental and Health Policy Analysis. 5 Units.**

Connections among the life sciences, social sciences, public health, and public policy. The economic, social, and institutional factors that underlie environmental degradation, the incidence of disease, and challenges facing the health care system including high spending and inequalities in access to health care. Public policies to address these problems. Topics include pollution regulation, climate change policy, biodiversity protection, health insurance, health care regulation, health disparities, and health care reform. HUMBIO 3B, with HUMBIO 2B and HUMBIO 4B, satisfies the Writing in the Major (WIM) requirement for students in Human Biology. HUMBIO 3A and HUMBIO 3B are designed to be taken concurrently and exams or quizzes for both sides may include material from joint module lectures. Concurrent enrollment is strongly encouraged and is necessary for majors in order to meet declaration deadlines. Please note that Human Biology majors are typically required to take the Human Biology Core Courses for a letter grade; however in academic year 20-21 majors may count courses taken for a letter grade or for Credit (CR).

**HUMBIO 44. Diagnostic Odysseys In Medicine. 1 Unit.**

Medicine is rapidly evolving, with increasing emphasis on genetic testing, immunophenotyping and integration of technology to guide diagnosis. In this course, experts from Stanford and Silicon Valley will highlight exciting developments. Topics include the latest developments in genetics and genomics (including genome testing in clinical practice, direct to consumer testing, and frontiers in neurogenetics), immunophenotyping, utilization of databases to research diseases and the emerging field of machine learning and clinical decision support in optimizing diagnostic strategies. Students who wish to engage in a mentored multi-disciplinary team-based research project related to advanced diagnostic techniques can additionally enroll in MED 239. Same as: MED 244

**HUMBIO 4A. The Human Organism. 5 Units.**

Integrative Physiology: Neurobiology, endocrinology, and organ system function, control, and regulation. HUMBIO 4A and HUMBIO 4B are designed to be taken concurrently and exams for both sides may include material from joint module lectures. Concurrent enrollment is strongly encouraged and is necessary for majors in order to meet declaration deadlines. Please note that Human Biology majors are typically required to take the Human Biology Core Courses for a letter grade; however in academic year 20-21 majors may count courses taken for a letter grade or for Credit (CR).

**HUMBIO 4B. Behavior, Health, and Development. 5 Units.**

Research and theory on human behavior, health, and life span development. How biological factors and cultural practices influence cognition, emotion, motivation, personality, and health in childhood, adolescence, and adulthood. HUMBIO 4B, with HUMBIO2B and HUMBIO 3B, satisfies the Writing in the Major (WIM) requirement for students in Human Biology. HUMBIO 4A and HUMBIO 4B are designed to be taken concurrently and exams or quizzes for both sides may include material from joint module lectures. Concurrent enrollment is strongly encouraged and is necessary for majors in order to meet declaration deadlines. Please note that Human Biology majors are typically required to take the Human Biology Core Courses for a letter grade; however in academic year 20-21 majors may count courses taken for a letter grade or for Credit (CR).

**HUMBIO 4Y. Practicum in Child Development. 1 Unit.**

Learning about young children's physical, emotional, social, cognitive, and language development through guided observations and discussions from Bing Nursery School, Stanford's lab school for research and training in child development. Weekly guided observations and 5 discussion meetings. Pre- or corequisite: HUMBIO 4B (formerly 3B): Behavior, Health, and Development.

**HUMBIO 51. Big Data for Biologists - Decoding Genomic Function. 3 Units.**

Biology and medicine are becoming increasingly data-intensive fields. This course is designed to introduce students interested in human biology and related fields to methods for working with large biological datasets. There will be in-class activities analyzing real data that have revealed insights about the role of the genome and epigenome in health and disease. For example, we will explore data from large-scale gene expression and chromatin state studies. The course will provide an introduction to the relevant topics in biology and to fundamental computational skills such as editing text files, formatting and storing data, visualizing data and writing data analysis scripts. Students will become familiar with both UNIX and Python. This course is designed at the introductory level. Previous university-level courses in biology and programming experience are not required.

**HUMBIO 57. Epidemic Intelligence: How to Identify, Investigate and Interrupt Outbreaks of Disease. 4 Units.**

(HUMBIO students must enroll in HUMBIO 57. Med/Graduate students must enroll in EPI 247.) We will cover: the components of public health systems in the US; principles of outbreak investigation and disease surveillance; different types of study design for field investigation; visualization and interpretation of public health data, including identification and prevention of biases; and implementation of disease control by public health authorities. Students will meet with leaders of health departments of the state and the county and will be responsible for devising, testing and evaluating a field questionnaire to better understand the complexities of field research. (Formerly HRP 247). Same as: EPI 247

**HUMBIO 5E. Science Education in Human Biology. 1 Unit.**

In this seminar, students will learn about research on science education. They will use this knowledge to create and analyze teaching material such as section plans, exams, and problem sets. Material produced in this course will be related to the topics covered in the core course of the Program in Human Biology. Students will experience and practice various teaching styles. Prerequisite: Human Biology Core or equivalent or consent of instructor.

**HUMBIO 65. Biosocial Medicine: The Social, Psychological, and Biological Determinants of Behavior and Wellbeing. 3 Units.**

Explores how social forces, psychological influences, and biological systems combine to affect human behavior in early childhood, in the educational experience, and throughout the life course. Examines how behaviors are linked to well-being. Uses a flipped classroom model, in which a series of lectures are available for students to view on-line before class. In-class time then focuses on case studies from published research. Students must enroll in HUMBIO 65 for a letter grade to be eligible for Ways credit.

Same as: EDUC 205, SOMGEN 215

**HUMBIO 71A. Race in Science. 1 Unit.**

What are the roles of race and racism in science, technology, and medicine? 3-course sequence; each quarter can be taken independently. Fall quarter focuses on science. What is the science of race and racism? How does race affect scientific work? Weekly guest speakers will address such issues as the psychology and anthropology of race and racism; how race, language, and culture affect education; race in environmental science and environmental justice; the science of reducing police violence; and the role of race in genomic research. Talks will take a variety of forms, from panel discussions to interviews and lectures. Weekly assignments: read a related article and participate in an online discussion.

Same as: AFRICAAM 51A, CEE 151A, COMM 51A, CSRE 51A, STS 51A

**HUMBIO 71B. Race in Technology. 1 Unit.**

What are the roles of race and racism in science, technology, and medicine? 3-course sequence; each quarter can be taken independently. Winter quarter focuses on technology. How do race and racism affect the design and social impact of technology, broadly defined? Can new or different technology help to reduce racial bias? Invited speakers will address the role of race in such issues as energy infrastructure, nuclear arms control, algorithmic accountability, machine learning, artificial intelligence, and synthetic biology. Talks will take a variety of forms, ranging from panel discussions to interviews and lectures. Weekly assignments: read a related article and participate in an online discussion.

Same as: AFRICAAM 51B, BIOE 91B, CEE 151B, COMM 51B, CSRE 51B, STS 51B

**HUMBIO 71C. Race in Medicine. 1 Unit.**

What are the roles of race and racism in science, technology, and medicine? 3-course sequence; each quarter can be taken independently. Spring quarter focuses on medicine. How do race and racism affect medical research and medical care? What accounts for health disparities among racial groups? What are the history, ethics, legal, and social issues surrounding racialized medical experiments and treatments? Invited speakers will address these and other issues. Talks will take a variety of forms: conversations, interviews, panels, and others. Weekly assignments: read a related article and participate in an online discussion.

Same as: AFRICAAM 51C, BIOE 91C, CEE 151C, CSRE 51C, STS 51C

**HUMBIO 79Q. Sexuality and Society. 3 Units.**

This course will explore how sexual identity, attitudes, and behaviors are shaped by the messages sent by the various agents of society such as schools, family, peers, media, and religious, medical, and political institutions. The interaction of biology, psychology, and socio-cultural factors, such as gender roles and sexual/relationship scripts will be discussed, as will the intersection of sexuality and notions of love, romance, and commitment. Critical developmental periods, such as adolescence and emerging adulthood will be examined in depth. Students will explore their own values and feelings about sexuality and come to an understanding of how their beliefs were formed. We will discuss how information about sexuality is disseminated in our society and what we can do to help ensure that such information is used in a way that promotes healthy self-conceptions, behavior, and relationships.

**HUMBIO 82A. Qualitative Research Methodology. 3 Units.**

This course introduces students to core concepts and methods of qualitative research. Through a variety of hands-on learning activities, readings, field experiences, class lectures and discussions, students will explore the process and products of qualitative inquiry. This course is designed particularly to support Human Biology undergraduates in designing, proposing and preparing for Honors Thesis research; students may use the course assignments and office hours to support individual research needs (e.g., proposal design, IRB protocol, pilot work).

**HUMBIO 82B. Advanced Data Analysis in Qualitative Research. 3 Units.**

This course is designed to support upperclass undergraduates who have collected *z* or are collecting *z* qualitative data in completion of Honors Thesis research. The course will review methods of qualitative data organization (field note amendment, transcription, data indexing, conceptual memo writing) and teach methods of qualitative data analysis (multi-stage coding, data modeling, charting, use of analytic software) and examine best methods for the reporting of qualitative research. The course introduces methodologies through readings, sample data sets, and group practice; students then display learning by executing these methodologies on their own data, and reporting findings and methods.

**HUMBIO 88. Introduction to Statistics for the Health Sciences. 4 Units.**

Students will learn the statistical tools used to describe and analyze data in the fields of medicine and epidemiology. This very applied course will rely on current research questions and publicly available data. Students will gain proficiency with Stata to do basic analyses of health-related data, including linear and logistic regression, and will become sophisticated consumers of health-related statistical results.

**HUMBIO 89. Introduction to Health Sciences Statistics. 3 Units.**

This course aims to provide a firm grounding in the foundations of probability and statistics, with a focus on analyzing data from the health sciences. Students will learn how to read, interpret, and critically evaluate the statistics in medical and biological studies. The course also prepares students to be able to analyze their own data, guiding them on how to choose the correct statistical test, avoid common statistical pitfalls, and perform basic functions in R deducer. Cardinal Course certified by the Haas Center.

**HUMBIO 89X. Introduction to Probability and Statistics for Epidemiology. 3 Units.**

(HUMBIO students must enroll in HUMBIO 89X. Med/Graduate students must enroll in EPI 259.) Topics: random variables, expectation, variance, probability distributions, the central limit theorem, sampling theory, hypothesis testing, confidence intervals. Correlation, regression, analysis of variance, and nonparametric tests. Introduction to least squares and maximum likelihood estimation. Emphasis is on medical applications. (Formerly HRP 259).

Same as: EPI 259

**HUMBIO 9. Public Service Internship Preparation. 1 Unit.**

Are you prepared for your internship this summer? This workshop series will help you make the most of your internship experience by setting learning goals in advance; negotiating and communicating clear roles and expectations; preparing for a professional role in a non-profit, government, or community setting; and reflecting with successful interns and community partners on how to prepare sufficiently ahead of time. You will read, discuss, and hear from guest speakers, as well as develop a learning plan specific to your summer or academic year internship placement. This course is primarily designed for students who have already identified an internship for summer or a later quarter. You are welcome to attend any and all workshops, but must attend the entire series and do the assignments for 1 unit of credit.

Same as: EARTHSYS 9, EDUC 9, PUBLPOL 74, URBANST 101