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 from some of HumBio's most engaging faculty. Each week the class will feature a faculty member addressing three central questions: What do I do? Why is it important? 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, visiting office hours, connecting lecture topics with current events or journal articles, paying full courteous attention to speakers and peers, and creating a study guide. 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 4 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, including those of lesser biodiversity. Satisfies Central Menu Area 4 for Bio majors. Prerequisite: BIO 101 or BIO 43 or HUMBIO 2A or BIO 81 and 84 or consent of instructor. Graduate level students will be expected to conduct a literature research exercise leading to a written paper, addressing a topic of their choosing, derived from any of the themes discussed in class.
Same as: HUMBIO 112H

HUMBIO 113. The Human-Plant Connection. 3 Units.
The intertwined biology 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 80 or consent of instructor. Graduate level students will be expected to conduct a literature research exercise leading to a written paper, addressing a topic of their choosing, derived from any of the themes discussed in class.
Same as: BIO 144, BIO 234

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, 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; additional requirement for 3 units is completion of a significant term paper. Only students taking the course for 3 units may request a letter grade. Enrollment limited to students with sophomore academic standing or above. This course must be taken for a minimum of 3 units to be eligible for Ways credit.
Same as: CHPR 113

HUMBIO 114. Environmental Change and Emerging Infectious Diseases. 4-5 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 118. Theory of Ecological and Environmental Anthropology. 5 Units.
Dynamics of culturally inherited human behavior and its relationship to social and physical environments. Topics include a history of ecological approaches in anthropology, subsistence ecology, sharing, risk management, territoriality, warfare, and resource conservation and management. Case studies from Australia, Melanesia, Africa, and S. America.
Same as: ANTHRO 90C

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. Upper division course with preference given to upperclassmen.

HUMBIO 120A. American Health Policy. 3 Units.
Issues in health care reform and the policy making process, the evolution of current systems, and theories underlying efforts for change. The national search for solutions to the problems of the uninsured, and the feasibility, options, and ramifications of alternative proposals for health care reform. Student presentations. Prerequisite: Human Biology 4B or equivalent, Human Biology 120, or consent of instructor.

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; additional requirement for 3 units (HUMBIO only) is completion of a significant term paper.
Only students taking the course for 3 units may request a letter grade. Enrollment limited to students with sophomore academic standing or above. This course must be taken for a minimum of 3 units to be eligible for Ways credit.
Same as: FAMMED 244

HUMBIO 122. Beyond Health Care: the effects of social policies on health. 3 Units.
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.
Prerequisites: HUMBio 4B or equivalent, and some background in research methods and statistics, or Instructor permission.
Same as: PEDS 222

HUMBIO 122M. Challenges of Human Migration: Health and Health Care of Migrants and Autochthonous Populations. 3 Units.
(Undergraduate students must enroll in HUMBIO 122M. MD and 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.
Same as: AFRICAAM 132, CSRE 122S

HUMBIO 123. Obesity in America: Clinical and Public Health Implications. 3-4 Units.
Interdisciplinary clinical, research, and policy approaches. The prevalence, predictors, and consequences of obesity and diabetes; biological and physiological mechanisms; clinical treatments including medications and surgery; and the relevance of behavioral, environmental, economic, and policy approaches to obesity prevention and control. Undergraduate prerequisite: Human Biology core or Biology Foundations, or consent of instructor. HumBio students must enroll in HumBio 123. CHPR Master’s students who are not medical students enroll in CHPR 223 for a letter grade. Priority for enrollment given to CHPR master’s students.
Same as: CHPR 223

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. Prerequisites: HumBio core (or equivalent) and statistics requirements. The course will feature concepts from microeconomic theory, statistics, and econometrics.

HUMBIO 124C. Global Child Health. 3-5 Units.
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 prevent an overview of the role of culture, gender, and non-state actors (NGOs, foundations, etc.) on health and health policy. Upper division course with preference given to upperclassmen.
Same as: MED 124, PEDS 124

HUMBIO 124E. Economics of Infectious Disease and Global Health. 3 Units.
Introduction to global health topics such as childhood health, hygiene, drug resistance, and pharmaceutical industries from an economic development perspective. Introduces economic concepts including decision-making over time, externalities, and incentives as they relate to health. Prerequisite: Human Biology Core or Biology Foundations or equivalent or consent of the instructor.
Same as: MED 236

HUMBIO 125. Current Topics and Controversies in Women's Health. 2-3 Units.
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. For Ways credit eligibility, students must enroll in HUMBIO 125 for a minimum of 3 units and a letter grade. PhD minor in FGSS, enroll in FEMGEN 256 for 2 - 3 units and for a letter grade. Med students enroll in OBGY 256 for 2 units. Undergraduate prerequisite: Human Biology Core or Biology Foundations or equivalent or consent of instructor.
Same as: FEMGEN 256, OBGY 256

HUMBIO 126. Promoting Health Over the Life Course: the Science of Healthy Living. 3 Units.
(HUMBIO students must enroll in HumBio 126. CHPR students must enroll in CHPR 226 for a letter grade.) 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. Undergraduate prerequisite: Human Biology Core or equivalent or consent of instructor. Students enrolled in CHPR 226 must complete additional assignments appropriate for its Masters level listing. Undergraduate prerequisite: Human Biology Core or equivalent or consent of instructor.
Same as: CHPR 226

HUMBIO 126A. Advanced Seminar in Health and Security. 3 Units.
In this course, we explore the growing interconnections between health and security. Global health can no longer be addressed without some important consideration of international security as war, civil conflict and political instability have increasingly defined the health challenges in major parts of the world. This course will address the interaction of three types of security: human, national, and international. Health is obviously a component of human security. However, it has also been raised as a concern of national and international security, particularly in areas where HIV/AIDS and Ebola have been prevalent and where the risk of pandemic outbreaks is high. This course will bring together a cross-disciplinary examination of these issues and address the opportunities and potential risks of tightly linking the provision of essential health services to security considerations. We will use case studies to explore both the conceptual and technical issues inherent in health and security. The challenges of Ebola, HIV, complex humanitarian emergencies, and pandemics will be explored in detail. As part of each discussion, the intense interaction of biology, service delivery, political legitimacy, human rights, and international relations will be examined. Upper division course with preference given to upperclassmen.

HUMBIO 127A. Community Health: Assessment and Planning I. 4 Units.
Major determinants of health in a community. Working with community partners to identify health issues and plan programs and policies to prevent disease and promote health. Service learning component involving students in community health assessment techniques. Final grade given upon completion of HUMBIO 127B. Service Learning Course (certified by Haas Center). Prerequisite: HUMBIO 4B or equivalent, or consent of instructor.
HUMBIO 127B. Community Health: Assessment and Planning II. 4 Units.
Continuation of 127A. Service learning course with emphasis on conducting community health assessment and planning projects in collaboration with community-based organizations. Service Learning Course (certified by Haas Center). Prerequisite: HUMBIO 4B or equivalent HUMBIO 127A, or consent of instructor.

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 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 and human rights. The course is intended for students interested in global health, development studies, or international relations, and provides opportunities for in-depth discussion and interaction with experts in the field. Prerequisite: Human Biology Core or Biology Foundations or equivalent or consent of the instructor.

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 the instructor.
Same as: MED 129

HUMBIO 130. Human Nutrition. 4 Units.
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. HUMBIO students must enroll in HUMBIO 130. CHPR master's students must enroll for a letter grade.
Undergraduate prerequisite: 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. Prerequisite: 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. Prerequisite: 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 136. Human Physiology Laboratory. 4 Units.
This laboratory course is active and inquiry based. Aspects of exercise and temperature are explored; however, the specific questions the class tackles differ each quarter. Samples of past questions: Does lactic acid accumulation correlate with exercise fatigue at different exercise and body temperatures? Does palm cooling during exercise mitigate the effect of body temperature on fatigue with or without evaporative cooling? Students participate both as experimenters and as subjects of the experiments in two-person teams. Participants must be in good physical condition, though not necessarily athletes, and must be willing to participate in strenuous exercise routines under adverse environmental conditions. Varsity athletes concurrently participating in a spring sport must consult the instructor before applying. Discussion sessions include student presentations of journal articles, data analyses, and feedback on individual WIM research proposals. By application only, see sites.stanford.edu/bio107/humbio136 for the application form. Prerequisite: Bio 42 or HumBio 4A. Satisfies WIM for Biology.
Same as: BIO 107
HUMBIO 139S. Sport and Exercise Medicine. 3 Units.
Formerly HUMBIO 139E. 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. Prerequisite: Human Biology Core or Biology Foundations or equivalent or consent of instructor.

HUMBIO 140. Sex and Gender in Human Physiology and Disease. 2-3 Units.
(HumBio students must enroll in HumBio 140.) 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 lifespan, 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. Prerequisite: Human Biology Core or Biology Foundations or equivalent, or consent of instructor. HUMBIO students must enroll for 3 units. 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. Prerequisite: HUMBIO 3B 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. Prerequisite: 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. Prerequisite: Human Biology Core or Biology Foundations or equivalent, or consent of instructor.

HUMBIO 144. Boys' Psychosocial Development. 4 Units.
Focuses on early childhood through adolescence. 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. Prerequisite: Upper division course with preference given to upperclassmen.

HUMBIO 145L. The Biology and Evolution of Language. 4-5 Units.
Lecture course surveying the biology, linguistic functions, and evolution of the organs of speech and speech centers in the brain, language in animals and humans, the evolution of language itself, and the roles of innateness vs. culture in language. Suitable both for general education and as preparation for further studies in anthropology, biology, linguistics, medicine, psychology, and speech & language therapy. Anthropology concentration: CS, EE. No prerequisites.
Same as: ANTHRO 171, ANTHRO 271

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? mOptional: The course will be taught in conjunction with an optional two-unit discussion section or engaged learning component.
Same as: ANTHRO 286, PSYC 286

HUMBIO 146D. Developmental Disabilities: From Biology to Policy. 3 Units.
Fifteen percent of US children have disabilities. While advances in medicine and technology have increased life expectancy for these children, health care delivery, education, and public attitudes have not kept pace. Students in this course will learn the possibilities and limitations of new biomedical treatments of Down syndrome, cerebral palsy, and autism. Students will also evaluate the impact of public policy initiatives, such as the Individuals with Disabilities Education Act and Americans with Disabilities Act on inclusion and participation in society. Prerequisite: HUMBIO 251L or Human Biology Core or equivalent. Same as: PEDS 246

HUMBIO 147. Biology, Culture and Family in Early Development. 3-4 Units.
Early childhood is a time of both enormous promise and vulnerability. Parents differ widely in their practices and beliefs about their role in enabling children to avoid risk and to achieve their potential for a healthy and productive life in the particular physical, social and cultural contexts of the communities and societies in which they live. In this seminar we will evaluate evidence from the biological and social sciences showing how experiences in infancy have profound and enduring effects on early brain architecture, with consequences for later language, cognitive, and socio-emotional development in childhood and adulthood. We will also consider the challenges of designing more effective social policies and programs to provide support for families in diverse socioeconomic and cultural contexts, who all want to help their children thrive. A community-service learning option, working with children as a reading tutor, is included for students taking this class for 4-units. Enrollment is limited and consent of instructor is required. Please send a brief statement of your interests, goals, and academic preparation relevant to the themes of this class to Prof. Fernald (afernald@stanford.edu). Pre requisites: Psych 01 and Psych 60, or Human Biology 3B. Same as: PSYCH 176.
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. Prerequisites: HumBio 2A and HUMBIO 3A or BIO 82 and BIO 83 or consent of instructor.

HUMBIO 152. Viral Lifestyles. 3 Units.
Viral lifestyles is a seminar devoted to exploring contemporary topics in microbiology with a focus on the examination of the major transitions in evolution. The course includes lectures and will provide an opportunity for students to interact with each other, the instructor and guest lecturers to explore novel research areas in microbiology that are still being formed. The course will begin with lectures on topics such as the major transitions framework, postulated by John Maynard Smith and Eors Szathmary, proposes that major leaps in evolution follow the major transitions 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.

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. Prerequisite: Human Biology core or Biology Foundations or equivalent, or consent of instructor.

HUMBIO 154A. Engineering Better Health Systems: modeling for public health. 4 Units.
This course teaches engineering, operations research and modeling techniques to improve public health programs and systems. Students will engage in in-depth study of disease detection and control strategies from a "systems science" perspective, which involves the use of common engineering, operations research, and mathematical modeling techniques such as optimization, queuing theory, Markov and Kermack-McKendrick models, and microsimulation. Lectures and problem sets will focus on applying these techniques to classical public health dilemmas such as how to optimize screening programs, reduce waiting times for healthcare services, solve resource allocation problems, and compare macro-scale disease control strategies that cannot be easily evaluated through randomized trials. Readings will complement the lectures and problem sets by offering critical perspectives from the public health history, sociology, and epidemiology. In-depth case studies from non-governmental organizations, departments of public health, and international agencies will drive the course. Prerequisites: A course in introductory statistics, and a course in multivariable calculus including ordinarily differential equations. Open to upper-division undergraduate students and graduate students. Human Biology majors enroll in HUMBIO 154A. Prerequisite: MATH 51 or CME 100 and Human Biology Core or Bio 141 or BioHopk 174H.
Same as: HRP 234, MED 254

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. Prerequisite: Human Biology Core or Biology Foundations or equivalent 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. Human Biology 154 courses can be taken separately or as a series. Prerequisite: Human Biology core or Biology Foundations or equivalent, or instructor consent.

HUMBIO 155C. Human and Viruses Part III. 3 Units.
Comprehensive survey of human virology integrating epidemiology, molecular biology, clinical sciences, social sciences, history, and the arts. Emphasis on host pathogen interactions and policy issues. Prerequisite: prior enrollment MI 155A/HUMBIO 155H and MI 155B/HUMBIO 155V and concurrent enrollment with MI 155D.
Same as: MI 155C

HUMBIO 155D. Human and Viruses Part IV. 3 Units.
Comprehensive survey of human virology integrating epidemiology, molecular biology, clinical sciences, social sciences, history, and the arts. Emphasis on host pathogen interactions and policy issues. Prerequisite: prior enrollment in MI 155A/HUMBIO 155H and MI 155B/HUMBIO 155V and concurrent enrollment with MI155C.
Same as: MI 155D

HUMBIO 155H. Humans and Viruses I. 3 Units.
Introduction to human virology integrating epidemiology, molecular biology, clinical sciences, social sciences, history, and the arts. Emphasis is on host pathogen interactions and policy issues. Topics: polio and vaccination, smallpox and eradication, yellow fever and history, influenza and genomic diversity, rubella and childhood infections, adenovirus and viral morphology, ebola and emerging infection, lassa fever and immune response. Prerequisite: Concurrent enrollment in MI 155B or HUMBIO 155V.
Same as: MI 155A

HUMBIO 155V. Humans and Viruses II. 3 Units.
Introduction to human virology integrating epidemiology, molecular biology, clinical sciences, social sciences, history, and the arts. Emphasis on host pathogen interactions and policy issues. Topics: measles and viral epidemiology, rotavirus and world health, rabies and infections of the brain, HPV and cancer -causing viruses, herpes simplex and viral latency, CMV and viral teratogenesis, retrovirology and endogenous viral sequences, HIV and viral treatment, viral hepatitis and chronic infections, prions and diseases of life style. Prerequisite: Concurrent enrollment with MI155A or HUMBIO 155H.
Same as: MI 155B

HUMBIO 157. The Biology of Stem Cells. 4 Units.
The role of stem cells in human development and potential for treating disease. Guest lectures by biologists, ethicists, and legal scholars. Prerequisites: Human Biology Core or Biology Foundations or equivalent or consent of instructor.

HUMBIO 158. Extending Life by Controlling Chronic Disease. 3 Units.
The variability of the human genome and the role of genomic information in research, drug discovery, and human health. Concepts and interpretations of genomic markers in medical research and real life applications. Human genomes in diverse populations. Original contributions from thought leaders in academia and industry and interaction between students and guest lecturers. 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 158S. Genetics and Society. 3 Units.
This course will focus on social science engagement with developments in genetic research, focusing on two key issues. First, social scientists are trying to figure out how genetic data can be used to help them better understand phenomena they have been long endeavoring to understand. Second, social scientists try to improve understanding of how social environments moderate, amplify, or attenuate genetic influences on outcomes.
Same as: EDUC 373, SOC 232

HUMBIO 159. Genes and Environment in Disease Causation: Implications for Medicine and Public Health. 2-3 Units.
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. Prerequisite:Human Biology core or BIO 82 or consent of instructor. This course must be taken for a minimum of 3 units and a letter grade to be eligible for Ways credit.
Same as: HRP 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.
Preference to seniors and graduate students. 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. 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. Can our understanding of the neuroscience of how opiates affect the brain inform effective law and policy to stem the tide of this problem? 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. The class is taught by internationally and nationally recognized leaders in addiction science, legislation, and policy. 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 discussion that shape their understanding of the complex interplay between the issues surrounding addiction and increase the students' ability to more critically assimilate and interrogate information. Prerequisites: HumBio Core or PSYC 83 or instructor consent.

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 given to Seniors. Prerequisite: Human Biology core or BIO 82 and BIO 84 or consent of instructor.

HUMBIO 165. Frontiers in Global Mental Health. 3 Units.
This class will increase awareness of global mental health issues and social disparities while developing tools to address associated challenges both at home and abroad. Special attention will be placed on human rights issues including access to mental health care and the mental health of survivors of human rights abuses. Prerequisite: Human Biology Core or equivalent or consent of instructor.

HUMBIO 166. Food and Society: Exploring Eating Behaviors in Social, Environmental, and Policy Context. 4 Units.
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. Undergraduate Prerequisite: Human Biology Core or Biology Foundations or consent of instructor.

HUMBIO 167. The Art of Vision. 3 Units.
This course is about eyes and art. We explore how eyes are built, how they process visual information, and how they are affected by disease. And we explore how fine art and famous artists (from all eras, ancient to modern) have depended upon vision, both normal and abnormal. There are short diversions into animal eyes and the role of vision in music, literature, and sports. Prerequisite: HumBio 4A or BIO 84 or consent of instructor.

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 165SC. The Stanford Safari: Field Observations in Our Own Backyard. 2 Units.
Although Stanford is renowned as a place of learning and research, the goal of this class is to approach Stanford University as a subject worthy of study in and of itself. Students will study Stanford in terms of the built environment (e.g. architecture; how buildings and styles interact; how the landscape shapes the flow of people, plants, and animals), the human interactions (e.g. sociology of tourism, the politics of land use), and the ecology (flora, fauna, geology, climatology, and pest control) of campus. The students in this course will defamiliarize themselves with their campus environment and approach Stanford with new eyes—the eyes of the anthropologist, the photographer, the historian, the artist, and the tourist. We will explore its edifices, gardens, sculptures, open spaces, and commercial areas. Moreover, we will use Stanford as a lens to discuss a variety of disciplines: architecture, educational theory, California history, climatology, and natural history. But more than anything, we will focus on the human component, including the vision, drive, and serendipity that shaped the University. Taking the course students will hone their skills in field observation that will carry over to future field work in more distant locales, develop an interdisciplinary approach to analyzing complex institutions, and gain a deeper appreciation for the complexity and richness of Stanford that will enhance all aspects of their remaining time as undergraduates. On a daily basis, the class will consist of three components: class presentations and discussions, formal and informal talks by many of the local experts at Stanford, and topical field trips. Students will select a theme that is of personal interest and develop field observation techniques useful for their particular topics. Course assignments will be to give two presentations on specific aspects of Stanford. In addition, each student will keep a field note-book with daily observations and field notes, post a collection of photographic observations, and complete pertinent readings. Plan to work intensely and have a great time in the process.

HUMBIO 170. Facts, Science & Making Policy. 5 Units.
The World Is Flat, The Sun Revolves Around The Earth, and other Alternative Facts. The role of science in civil rights, justice, policy, criminal justice, evidence, education, and disabled rights. Prerequisite: Upper division course with preference given to upperclassmen.

HUMBIO 170A. Sex and the Law. 5 Units.
This course uses an interdisciplinary approach to examine the laws and regulation of sex in the United States by considering the legal, policy, social, political and scientific bases (or lack thereof) of such laws, the context and objectives of sex regulation, and the political dynamics of contemporary and controversial issues presented by this subject. Some laws reflect policies to protect persons from harm related to sexual conduct, such as rape, assault and pedophilia. Other laws impose notions of morality, such as sodomy, incest or polygamy, or homosexuality, or reflect policy or social judgments regarding abortion, contraceptives, and sexual activity of minors. Regulation often concern consensual conduct. This course will consider these topics from varying perspectives and policy objectives, and in the context of Constitutional and other liberty interests. Prerequisite: Upper division course with preference given to upperclassmen.
HUMBIO 172B. Children, Youth, and the Law. 5 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. Prerequisite: Upper division course with preference given to upperclassmen. Same as: PUBLPOL 172

HUMBIO 173. Science, Innovation and the Law. 5 Units.
The interaction of science, business and law: how scientific ideas are protected by law; the rights of those who invent, develop, and finance scientific discovery; the kinds of protections that apply; and how ideas are commercialized and brought to market. Guest speakers will include investors, start-up founders, scientists and inventors, and other relevant experts from IT, medical, pharma and biological sectors. The history of Silicon Valley will be examined as a paradigm for innovation. Prerequisite: Upper division course with preference given to upperclassmen. Same as: PUBLPOL 173

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 upper-classmen.

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 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. Same as: ENGLISH 108

HUMBIO 178. 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 17SC. Evolution and Conservation in Galápagos. 2 Units.
The tiny remote islands of Galápagos have played a large and central role in the study of evolution. Not surprisingly, they have also been central to the study of conservation. The fascinating adaptations of organisms to the unique ecosystems of the archipelago have left them particularly vulnerable to outside introductions. This seminar explores evolution, conservation, and their connection in the Galápagos. Using case-study material on finches, iguanas, tortoises, cacti, Scalesia plants, and more, we will explore current theory and debate about adaptation, sexual selection, speciation, adaptive radiation, and other topics in evolution. Similarly, we will explore the special challenges Galápagos poses today for conservation, owing to both its unusual biota and the increasing human impact on the archipelago. The first week is held on-campus, followed by an intensive eleven-day expedition to Galápagos to observe firsthand evolutionary phenomena and conservation issues. A chartered ship will serve as our floating classroom, dormitory, and dining hall as we work our way around the archipelago to visit as many as ten islands. For this portion of the class, undergraduates will be joined by a group of Stanford alumni and friends in a format called a Stanford "Field Seminar." Students are required to complete all course readings over the summer. Students will be asked to lead discussions and carry out literature research on the evolutionary and conservation biology of particular Galápagos species. The final assignment is a seven- to ten-page paper and class presentation as we travel in Galápagos. Travel to Galápagos will be provided and paid by Sophomore College (except incidentals) and is made possible by the support of the Stanford Alumni Association Travel/Study Program and generous donors. Students will return to campus late afternoon Saturday, September 22. Same as: ANTHRO 10SC

HUMBIO 180. Human Skeletal Evolution. 5 Units.
The interaction of science, business and law: how scientific ideas are protected by law; the rights of those who invent, develop, and finance scientific discovery; the kinds of protections that apply; and how ideas are commercialized and brought to market. Guest speakers will include investors, start-up founders, scientists and inventors, and other relevant experts from IT, medical, pharma and biological sectors. The history of Silicon Valley will be examined as a paradigm for innovation. Prerequisite: Upper division course with preference given to upperclassmen. Same as: PUBLPOL 173

HUMBIO 182. Peopling of the Globe: Changing Patterns of Land Use and Consumption Over the Last 50,000 Years. 3-5 Units.
Fossil, genetic and archaeological evidence suggest that modern humans began to disperse out of Africa about 50,000 years ago. Subsequently, humans have colonized every major landmass on earth. This class introduces students to the data and issues regarding human dispersal, migration and colonization of continents and islands around the world. We explore problems related to the timing and cause of colonizing events, and investigate questions about changing patterns of land use, demography and consumption. Students are introduced to critical relationships between prehistoric population changes and our contemporary environmental crisis. Same as: ANTHRO 18, EARTHSYS 21
HUMBIO 18SC. Conservation and Development Dilemmas in the Amazon. 2 Units.
This course explores the human dimensions of conservation efforts under way in the Amazon Basin of South America. It has two specific goals: (1) to introduce the human ecology of Amazonia; and (2) to assess the prospects for joint efforts at biodiversity conservation and community development. We will draw on case studies to investigate such topics as the causes and consequences of deforestation, the social impact of parks and protected areas, and the potential for "Integrated Conservation and Development Projects" (ICDPs) such as extractive reserves, natural forest management, biodiversity prospecting, and community-based ecotourism. The course views Amazonia as a microcosm of the challenges facing conservation and development efforts today in the Third World. nPart of the course is an intensive 11-day expedition to the Peruvian Amazon, at no extra cost, to observe firsthand the conservation and development dilemmas discussed in class. We will visit ecolodges in the rainforest, walking miles of trails to learn about local flora, fauna, and conservation efforts. We will also visit Machu Picchu in the upper reaches of the rainforest. For the travel portion of the class, undergraduates will be joined by a group of Stanford alumni and friends. nStudent contributions and presentations are emphasized throughout the course. Students are expected to come well-prepared to each session, to lead discussions, and to carry out literature research. The final assignment is a 6 to 8 page paper on a case study of your own choosing or an equivalent piece of a longer collaborative paper that offers a critical assessment of one particular conservation and/or development project in or near the region we will visit. Students will present the main findings of their papers in a joint seminar of undergraduates and alumni as we travel in the Peruvian Amazon. nNote: Students will arrive on campus and will be housed at Stanford until we leave for the Amazon. Travel to and from Peru, organized by the Travel/Study Program of the Stanford Alumni Association, is included; costs are defrayed by the Stanford Field Seminar Fund and generous donors.
Same as: ANTHRO 11SC

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 five required workshops, written reflection and presentation. Satisfies the Capstone Requirement of the major.

HUMBIO 192A. Human Biology Synthesis. 2-3 Units.
Co-Requisite HUMBIO 191. Restricted to Human Biology majors. Expands the work of the Human Biology Practicum; (can also focus on a different aspect of the Area of Concentration). Allows students the opportunity to craft a culminating, creative work of scholarship based on a synthesis of personal and academic interests, including service projects. Exhibited during senior year. Students should enroll in either 3 units for two quarters or 2 units for three quarters.

HUMBIO 192B. Human Biology Synthesis. 1-3 Unit.
Co-Requisite HUMBIO 191. Restricted to Human Biology majors. Expands the work of the Human Biology Practicum; (can also focus on a different aspect of the Area of Concentration). Allows students the opportunity to craft a culminating, creative work of scholarship based on a synthesis of personal and academic interests, including service projects. Exhibited during senior year. Students should enroll in either 3 units for two quarters or 2 units for three quarters.

HUMBIO 192W. Human Biology Synthesis. 2-3 Units.
Co-Requisite HUMBIO 191. Restricted to Human Biology majors. Expands the work of the Human Biology Practicum; (can also focus on a different aspect of the Area of Concentration). Allows students the opportunity to craft a culminating, creative work of scholarship based on a synthesis of personal and academic interests, including service projects. Exhibited during senior year. Students should enroll in either 3 units for two quarters or 2 units for three quarters.

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: 193 or 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. Prerequisite: 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 19SC. Parks and Peoples: Dilemmas of Protected Area Conservation in East Africa. 2 Units.
The world-famous landscapes of East Africa, including Serengeti National Park, Ngorongoro Conservation Area, and the Rift Valley lakes of Tanzania form the backdrop for this special course on protected area conservation and its impacts on local people. The course is designed to explore the pros and cons of parks and protected areas as they affect flora, fauna, and human inhabitants, and to address the dilemma of how to achieve conservation in a manner that creates local community benefits and promotes social justice. We will use a case study approach to ask: (1) What approach to protected area (PA) conservation has been taken in each case? Who are the key proponents and what are their main social and ecological objectives? (2) How successful has the protected area been at achieving its conservation goals? (3) What are the benefits of the PA to people and who receives them? (4) What are the costs of the PA to people and who pays them? (5) Where benefits are not commensurate to costs, what, if anything, is being done to address the imbalance? How well is it working? (6) Are there alternative conservation models that would make the interests of parks and people more compatible, and reduce the tradeoffs between them? What is needed to operationalize these alternative models, and how do they incentivize conservation behavior among local residents? This course includes an intensive 12-day expedition to Tanzania to observe firsthand the dilemmas of parks and peoples we have discussed in class. We are scheduled to visit Tarangire, Lake Manyara, Mt. Meru, and Serengeti National Parks, the Ngorongoro Conservation Area, and nearby Maasai villages. Both on campus and in Tanzania, the course emphasizes student contributions and presentations. Students are required to read one or two books a month over the summer, and to come to campus in the fall well-prepared to discuss each one, including co-leading the discussion of one of the readings. Students are also expected to carry out literature research on a particular conservation dilemma in East Africa that is of interest to them for the final assignment of the seminar, a 6- to 8-page paper, and to present the main findings of that paper during evening seminars as we travel in East AfricanNote: Students will arrive on campus and will be housed at Stanford until we leave for the travel portion of the course. A group of 20-some Stanford alumni will join us for the last 2 days on campus and for the travel portion of the course.

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 25SI. Diverse Perspectives on Disabilities. 1-2 Unit.
This class investigates definitions and the complexities of life with a disability through discussion and panel based learning. Through student and parent panels, speakers, professors, and professionals in the field of disability, this class looks at the different perspectives and ways that disability interacts with the world. In addition to learning about the scientific, social and legal backgrounds students can also participate in a community volunteering project for an additional unit through Kids with Dreams or another community or student organization.

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 78 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, HRP 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.
Cross-listed with SOMGEN 237 and FEMGEN 237. HumBio students must enroll in HumBio 28 or AFRICAAM 28. 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. Medical and graduate students should enroll in SOMGEN 237 for 1-3 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

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 population biology. Topics: micro- and macro-evolution, population and molecular genetics, 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 Human Biology majors are required to take the Human Biology Core Courses for a letter grade.

HUMBIO 2B. Culture, Evolution, and Society. 5 Units.
Introduction to the evolutionary study of human diversity. Hominid evolution, the origins of social complexity, social theory, population dynamics; the impact of disease on societies and the emergence of the modern world system, emphasizing the concept of culture and its influence on human differences. HUMBIO 2B, with HUMBIO 3B 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 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 Human Biology majors are required to take the Human Biology Core Courses for a letter grade.

HUMBIO 3A. Cell and Developmental Biology. 5 Units.
The principles of the biology of cells: principles of human developmental biology, 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), drug discovery 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 Human Biology majors are required to take the Human Biology Core Courses for a letter grade. Prerequisite: college chemistry or completion of the HumBio Core on-line chemistry lecture series during the fall quarter.

HUMBIO 3B. 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 3B, with HUMBIO2B 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 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 Human Biology majors are required to take the Human Biology Core Courses for a letter grade.

HUMBIO 3Y. Practicum in Child Development. 1 Unit.
Practicum experience at Bing Nursery School for 1-1/4 hours of observation per week, class meeting every other week for 1 hour for a total of 5 meetings. Pre- or corequisite: HUMBIO 3B.

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 Human Biology majors are required to take the Human Biology Core Courses for a letter grade.

HUMBIO 4B. 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 4B, with HUMBIO 2B 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 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 Human Biology majors are required to take the Human Biology Core Courses for a letter grade.

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.
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 and conducting their own investigation of a health problem. HUMBIO students must enroll in HUMBIO 57. HRP students must enroll in HRP 247.
Same as: HRP 247

HUMBIO 5E. Science Education in Human Biology. 1 Unit.
In this seminar, students will become familiar with 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 6. Human Origins. 5 Units.
The human fossil record from the first non-human primates in the late Cretaceous or early Paleocene, 80-65 million years ago, to the anatomically modern people in the late Pleistocene, between 100,000 to 50,000 B.C.E. Emphasis is on broad evolutionary trends and the natural selective forces behind them.
Same as: ANTHRO 6, ANTHRO 206

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.
Same as: EDUC 205, SOMGEN 215

HUMBIO 74. 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 74, PHIL 74A

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.
Goal is to develop knowledge and skills for designing and conducting qualitative research studies including purposes, conceptual contexts, research questions, methods, validity issues, and interactions among these facets. Each student designs a qualitative research study.

HUMBIO 82B. Advanced Data Analysis in Qualitative Research. 3 Units.
For students writing up their own qualitative research. Students prepare a complete draft presenting their own qualitative research study including results, with reports drafted section by section, week by week. Class provides feedback, guidance, support.

HUMBIO 84. Practical Analysis of Epidemiologic and Biological Data. 3 Units.
This course will teach students how to think about and analyze quantitative data. Students will learn to apply univariate and multivariable methods (using Stata software) to either their own data or data from publicly available sources. A central part of the course will consist of the joint planning and execution of an epidemiologic analysis of real-world data and the production of a manuscript for submission to a scientific journal. This course focuses on health-related data, although these methods can be applied much more broadly.

HUMBIO 85A. Essential Statistics for Human Biology. 4 Units.
Introduction to statistical concepts and methods that are essential to the study of questions in biology, environment, health and related areas. The course will teach and use the computer language R and Python (you learn both, choose one). Topics include distributions, probabilities, likelihood, linear models; illustrations will be based on recent research.
Same as: BIO 108

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 deductor. Cardinal Course certified by the Haas Center.

HUMBIO 8P. Pre-field Course for Bolivia Impact Abroad in Child Family Health International. 1 Unit.
Enrollment restricted to undergraduates participating in Impact Abroad’s Boliva Program. Focus is on understanding service-learning principles and the historical, social and political context of Bolivia’s health system.

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: ARTSINST 40, EARTHSYS 9, EDUC 9, PUBLPOL 74, URBANST 101
HUMBIO 91Q. Neuroethology: The Neural Control of Behavior. 3 Units.
Preference to sophomores. Animal behavior offers insights about evolutionary adaptations and this seminar will discuss the origins of the study of animal behavior and its development to the present. How does the nervous system control behavior and how is it changed by behavior? We will analyze and discuss original research papers about the neural basis of behavior. The use and misuse of parallels between animal and human behavior. Possible field trip to observe animals in their natural habitat.
Same as: BIO 32Q

HUMBIO 94Q. Law, Lawyers and Justice in Cinema. 4 Units.
Examination of how the law, justice and lawyers are depicted in film, how real the depictions are, and the social issues that are the subjects of the film and the effect of film on change, attitudes and policy.

HUMBIO 96Q. Injustice, Advocacy and Courage: The Path of Everyday Heroes. 3 Units.
This course will study the paradigms of people of courage, action and energy who have fought against injustice by advocating for causes against great odds and at personal risk. The focus will be on everyday people who have taken action, often at great personal risk, not for ambition, but because of their convictions and steadfast commitment to their beliefs.

HUMBIO 96SI. Big problems, big solutions? tackling difficult issues in today's healthcare system. 1-2 Unit.
It is impossible to innovate in healthcare without first understanding the context in which these innovations take place. The course aims to allow students an intimate setting to debate issues that plague healthcare today, and work with guest speakers (from Stanford Medicine, Stanford Biodesign, RockHealth to Apple Health and more!) to gain insight into what's actually being done about it. Some controversial topics highlighted include: Healthcare Legislation (especially in the context of the last two administrations), Artificial Intelligence in Healthcare, Gene Therapy, and in-depth analysis of Failed Medical Devices and Innovations.