

HUMAN BIOLOGY

Courses offered by the Program in Human Biology are listed under the subject code HUMBIO on the (<http://explorecourses.stanford.edu/CourseSearch/search/?view=catalog&catalog=&page=0&q=HUMBIO&filter-catalognumber-HUMBIO=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search/?view=catalog&catalog=&page=0&q=HUMBIO&filter-catalognumber-HUMBIO=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search/?view=catalog&catalog=&page=0&q=HUMBIO&filter-catalognumber-HUMBIO=on>).

The program offers a Bachelor of Arts and a Bachelor of Science in Human Biology, as well as a minor and an honors program.

Mission of the Undergraduate Program in Human Biology

The mission of the undergraduate program in Human Biology is to provide students with an interdisciplinary approach to understanding human beings from biological, behavioral, social, and cultural perspectives. Courses in the major allow students to see connections and parallels with other fields as they learn to formulate and evaluate health, environmental, and other public policy issues that influence human welfare. The program prepares majors to pursue advanced training in professional or graduate programs.

To achieve these goals, all students complete a 30-unit core sequence, normally in the sophomore year, which provides the foundation for the major. Also during the sophomore year, students consult with student advisers to choose a faculty adviser and complete the declaration process. Together they plan a road map of course work designed to help each student focus on an Area of Concentration within Human Biology. Early planning and subsequent refining of an individualized course of study, in consultation with student and faculty advisers, are strengths and requirements of the program. The curriculum draws on faculty from across the University. To complete a B.A. or B.S. in Human Biology, students must take courses from within the program and from other University departments. Many Human Biology majors go on to advanced training in professional schools or graduate programs in the behavioral, natural, and social sciences, including coterminal master's degree programs in other University departments. Additional information about the major may be obtained from the program's offices or at the Program in Human Biology (<https://humanbiology.stanford.edu/>) web site.

Learning Outcomes (Undergraduate)

The program expects its undergraduate majors to be able to demonstrate the following learning outcomes.

Communication

Because Human Biology is an interdisciplinary program with an emphasis on both empirical inquiry and applied knowledge, excellent communication skills are critical to majors. Successful students must be able to engage with literature and audiences not only from multiple disciplines but also with varying levels of subject expertise and to communicate information and ideas clearly, precisely, concisely, and purposefully in any setting. Toward this end, a graduate of Human Biology is expected to be able to:

1. adopt an appropriate style for written communication in the biological and social sciences
2. accurately summarize a scientific article

3. synthesize and criticize multiple sources of scientific literature
4. revise effectively in response to feedback
5. write collaboratively
6. present information visually in a variety of forms (charts, graphs, figures, and posters) for different audiences, purposes, and occasions
7. communicate in a variety of major scientific genres (such as abstracts, literature reviews, posters, research proposals, research presentations, and policy proposals) and popular genres (such as op-eds, PSA, podcasts, and science blogs)
8. use citations to provide context and to credit others for their intellectual contributions
9. communicate scientific knowledge to both specialist and non-specialist audiences
10. construct a well-supported, logical argument based on relevant evidence and established conceptual frameworks
11. frame a research question in relation to the current state of knowledge in a field
12. articulate a well-reasoned hypothesis
13. listen to any speaker and pose questions
14. deliver an oral presentation and respond to audience questions

Data Analysis

Data is used in the social and biological sciences to make observations and judgments regarding patterns of human behavior and function. These data are sometimes imperfect or incomplete, but they are used nevertheless to make decisions and policies regarding humans individually and in groups within the worlds they inhabit. Thus, students should cultivate a capacity within the Human Biology major to examine and analyze data. A graduate of Human Biology is expected to be able to:

1. recognize that different scientific disciplines draw on various sources and types of evidence
2. translate a research topic into a hypothesis or focused question that can be tested using quantitative or qualitative data
3. identify variables that are relevant to a study and describe their nature (e.g., categorical, continuous) and interrelationships (independent, dependent, covariates)
4. use statistical software to summarize and describe data of various types
5. choose an appropriate analytical framework or statistical model for testing a given hypothesis, considering the structure of the data (e.g., sample size, distribution, qualitative or quantitative nature)
6. employ quantitative or qualitative data to support a conclusion
7. understand and interpret the results of hypothesis tests
8. detect mistakes commonly made in empirical reasoning and data analysis
9. assess the limits of available data and identify potential sources of uncertainty
10. present data accurately, clearly, and effectively in the forms of tables, graphs, and figures
11. explore specialized modes of data analysis such as meta-analysis, bioinformatics, modeling, and epidemiological approaches

Scientific Literacy

The Program in Human Biology prepares students to join a broad scientific community with a culture of building and sharing knowledge. A goal of the major is to cultivate judicious consumers of research in the natural and social sciences, irrespective of their individual career paths. A graduate of Human Biology is expected to be able to:

1. appreciate the distinct roles of common genres of scientific writing, including peer-reviewed research papers, review articles, commentaries, and popular science writing
2. acknowledge and apply the normative and ethical standards of conducting and publishing research, including accuracy, transparency, and responsibility to colleagues and subjects
3. consider the credibility and importance of a published article and its relevance within a field
4. engage with peer-reviewed scientific literature actively and critically
5. identify research questions and understand their theoretical or practical importance
6. assess research methodologies including experimental or other study design
7. evaluate evidence and statistical analyses presented in support of claims
8. interpret data presented in a table, graph, or figure
9. use a hypothesis or conceptual framework to make predictions or pose questions about a novel setting

Student Advisers

Human Biology has an advising program comprising faculty and student advisers. Before declaring Human Biology as the undergraduate major, each student must meet with student advisers who assist in developing a coherent study plan based on an individualized Area of Concentration, and the selection of breadth, depth, and upper-division courses. The student advisers also assist students in selecting an appropriate faculty adviser and a suitable capstone experience for their Area of Concentration and career goals. Student advisers offer drop-in services during scheduled office hours every weekday.

Bachelor of Science in Human Biology

The B.S. in Human Biology (HUMBIO) requires 81+ units in the major divided among four levels of courses: fundamental program requirements, breadth requirement (20+ units), depth requirement (20+ units) and upper-division (3+ courses). The B.S. degree allows students a more scientific and technical focus for their studies, and requires completion of course work and specialization in the biological sciences, physical sciences, mathematics, and/or computer science and engineering. The degree is suitable for a variety of career trajectories, including for attending graduate or professional school, such as medical school. Students who plan to pursue graduate work should be aware of the admission requirements of the schools to which they intend to apply. Early planning is advisable to guarantee completion of major and graduate school requirements.

For the B.S. degree, majors take 10 or more units of breadth courses and five or more classes in the upper-division and depth courses from a set of pre-approved life and natural sciences courses. For the five or more B.S. eligible courses in the depth and upper division, three of those courses must be in the depth section. Many pre-approved courses satisfy University Ways requirements, specifically applied quantitative reasoning, formal reasoning, and scientific methods and analysis courses. Students still also take courses in the social sciences or humanities, although fewer than for the B.A. degree.

How to Declare a Major in Human Biology

Over the course of declaration, a prospective major must consult with the Human Biology advising team to obtain detailed information about the program and guidance in the development of an individual course of study. At the time the major is declared, the student submits a written statement (3-5 pages) of academic and long-term goals and the proposed list of courses satisfying the requirements for the major. The proposal is then reviewed by the student advisers who can help identify an appropriate faculty adviser.

It is important to declare in the sophomore year, and planning may begin once a student in good academic standing has passed two of six courses in the core. Students may officially declare in Axxess once they have received program approval and completed 4 of the 6 HumBio Core courses with a 'C-' or better. The program recommends that students finish the declaration process by the time they finish the HumBio core.

Degree Requirements

Course Requirements

	Units
Human Biology Core	30
The required core sequence introduces the biological and social sciences and, most importantly, relationships between the two. Classes meet throughout the academic year. The A and B series are designed to be taken concurrently. The required core sequence introduces the biological and social sciences and, most importantly, relationships between the two. Classes meet throughout the academic year. The A and B series are designed to be taken concurrently. Students should initiate the core in Autumn Quarter of the sophomore year. Freshmen are strongly advised to wait to start the HUMBIO Core until Autumn of sophomore year. Majors must earn a minimum letter grade of 'C-' in every core course. The Human Biology core consists of the following courses:	
HUMBIO 2A	Genetics, Evolution, and Ecology
HUMBIO 2B	Culture, Evolution, and Society
HUMBIO 3A	Cell and Developmental Biology
HUMBIO 3B	Environmental and Health Policy Analysis
HUMBIO 4A	The Human Organism
HUMBIO 4B	Behavior, Health, and Development
Statistics	3-5
The statistics course must be taken for a letter grade by majors. The minimum grade requirement is 'C-'. Statistics may be chosen from courses such as:	
BIO 141	Biostatistics
CME 106	Introduction to Probability and Statistics for Engineers
CS 109	Introduction to Probability for Computer Scientists
ECON 102A	Introduction to Statistical Methods (Postcalculus) for Social Scientists
EDUC 400A	Introduction to Statistical Methods in Education
EPI 259	Introduction to Probability and Statistics for Epidemiology
EPI 262	Intermediate Biostatistics: Regression, Prediction, Survival Analysis
HUMBIO 88	Introduction to Statistics for the Health Sciences
HUMBIO 89	Introduction to Health Sciences Statistics
SOC 180B	Introduction to Data Analysis
SOC 181B	Sociological Methods: Statistics
STATS 116	Theory of Probability
Capstone	1-10
Complete area from below:	
Human Biology Practicum	
HUMBIO 191	Human Biology Practicum
Human Biology Synthesis	
HUMBIO 192A	Human Biology Synthesis
HUMBIO 192W	Human Biology Synthesis

HUMBIO 192S	Human Biology Synthesis	
Honors in Human Biology		
HUMBIO 194	Honors	
Breadth Courses		20
Consistent with the student's chosen area of concentration topic. This requirement allows the student to explore the topic with a broad focus. Courses may include introductory-level courses from across the University and lab courses, and may be taken for credit or letter grade. The minimum grade requirement is 'C-'.		
Depth Courses		20
A minimum of five courses totaling at least 20 units consistent with the student's chosen area of concentration topic. This requirement allows the student to gain expertise on their chosen area. Courses are non-introductory and are usually numbered over 100. Three or more departments must be represented in the depth requirement. Each course must be taken for a letter grade and at least three units. The minimum grade requirement is 'C-'. Three or more courses in the Depth must be in your chosen degree option of B.S..		
Upper Division Electives		
Three courses selected from pre-approved list of life and natural science courses		
Minimum Total Units		81

Students who have previously taken HUMBIO 85 Essential Statistics for Human Biology, may use it to fulfill the statistics requirement. In certain circumstances, students completing an additional major or minor in another department may submit a petition to waive the units requirement for Statistics; contact Human Biology student services for more information. Students who did not declare before September 21, 2015, may not use STATS 60 to fulfill the statistics requirement.

Additional Information

Capstone (1-10 units)

The following options fulfill the Capstone (<https://humanbiology.stanford.edu/capstone/>) requirement:

- Human Biology Practicum:** HUMBIO 191 Human Biology Practicum (1 unit total, letter grade). Allows students to integrate their academics with their community-engaged learning, research or pre-professional experiences through reflective written work and presentation. Students can take workshops over several quarters, and enroll in one unit of 191 for the quarter they plan to complete the practicum.
- Human Biology Synthesis (by application):** This sequence should be taken for 2-3 units in Autumn (HUMBIO 192A Human Biology Synthesis), Winter (HUMBIO 192W Human Biology Synthesis) and/or Spring (HUMBIO 192S Human Biology Synthesis) for 6 units total, letter grade. The sequence is designed for students to expand upon the work of their area of concentration. It allows students the opportunity to craft a culminating, creative work of scholarship based on a synthesis of personal and academic interests, including service projects. The work must be exhibited during senior year.
- Honors in Human Biology (by application):** HUMBIO 194 Honors also satisfies the Capstone requirement.
- Non-Human Biology activities that fulfill the Capstone requirement:
 - Notation in Science Communication
 - Interdisciplinary Honors

Breadth and Depth Requirement

These courses inform the student's chosen area of concentration topic. The student selects courses for these two requirement categories in consultation with the advising staff, who approve the final course

selections. A Human Biology area of concentration topic generally falls within one (or a combination of 2) of the following areas of emphasis:

- Environment and Environmental Policy
- Health and Health Policy
- Human Performance
- Human Development
- Biomedical Science and Biocomputation
- Brain and Behavior
- Ethics and Medical Humanities
- Evolution

Upper-Division Requirement

Students must take three Human Biology upper-division courses numbered 100 to 189. These courses should be used to explore subjects outside the depth requirement. One upper-division course may be taken satisfactory/no credit. Each course must be taken for a minimum of 3 units. Minimum grade requirement for upper-division courses is 'C-'. All non-laboratory advanced HUMBIO courses (those numbered 100 to 189) fulfill the Human Biology upper-division requirement. A list of Overseas Studies courses that satisfy upper-division requirements can be found on the Overseas tab (p. 7) of this section of this bulletin.

Honors Program

The honors program in Human Biology provides qualified majors the opportunity to work closely with faculty on an individual research project, culminating in an honors thesis. Students may begin honors research from a number of starting points including topics introduced in the core or upper-division courses; independent interests stemming from an internship experience; or collaborating with faculty from the natural, social, or behavioral sciences.

Students may apply to the honors program if they have completed the Human Biology core with a minimum GPA of 3.0, have an overall Stanford GPA of 3.2, and meet other requirements detailed in the honors handbook. Interested students should consult the Human Biology Honors website (<http://humanbiology.stanford.edu/academics/honors/>) and meet with the Human Biology Associate Director or student services officer.

Most honors projects involve a total of 10-15 units of course work in HUMBIO 193 and 194:

		Units
HUMBIO 193	Research in Human Biology	1-5
HUMBIO 194	Honors	1-10

Admission to the honors program is by preliminary application in early February, followed by the full application in early March of the junior year. Students planning to undertake honors begin research or preparation as early as completion of the sophomore year.

The honors thesis is normally completed by the middle of Spring Quarter of the senior year. Honors students present summaries of their research at the Human Biology Senior Symposium in May.

Human Biology also holds a Summer Honors College just prior to Autumn Quarter each year for students who have applied to the honors program. Students apply to Summer Honors College in April of the junior year.

Bachelor of Arts in Human Biology

The B.A. in Human Biology (HUMBIO) requires a minimum of 81 units in the major divided among four types of courses: fundamental program requirements, breadth requirement (20+ units), depth requirement (20+ units) and upper-division (3+ courses). The B.A. degree is designed for students who prefer a traditional liberal arts degree with a curriculum

based across the natural sciences, social sciences, and humanities. The degree is suitable for a variety of career trajectories, including for attending graduate or professional school, such as medical school. Students who plan to pursue graduate work should be aware of the admission requirements of the schools to which they intend to apply. Early planning is advisable to guarantee completion of major and graduate school requirements.

For the B.A. degree 10 or more units of the breadth requirement and five or more of the classes in the upper-division and depth requirement must come from a set of pre-approved Social Sciences and Humanities courses. For the five or more B.A. eligible courses in your Depth and Upper Division, three of those courses must be in the Depth section. Many pre-approved courses additionally satisfy University Ways of Thinking and Doing requirements, specifically Aesthetic and Interpretive Inquiry, Creative Expression, Engaging Diversity, Ethical Reasoning, and Social Inquiry. Students pursuing a B.A. degree do take courses in the natural sciences, although fewer than for the B.S. degree.

How to Declare a Major in Human Biology

Over the course of declaration, a prospective major must consult with the Human Biology advising team to obtain detailed information about the program and guidance in the development of an individual course of study. At the time the major is declared, the student submits a written statement (3-5 pages) of academic and long-term goals and the proposed list of courses satisfying the requirements for the major. The proposal is then reviewed by the student advisors who can help identify an appropriate faculty advisor.

It is important to declare in the sophomore year, and planning may begin once a student in good academic standing has passed two of six courses in the core. Students may officially declare in Axxess once they have received program approval and completed 4 of the 6 HumBio Core courses with a 'C-' or better. The program recommends that students finish the declaration process by the time they finish the HumBio core.

Degree Requirements

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	Units
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Upper Division Electives	
Three courses selected from pre-approved list of social science and humanities courses	
Minimum Total Units	81
Students who have previously taken HUMBIO 85 Essential Statistics for Human Biology, may use it to fulfill the statistics requirement. In certain circumstances, students completing an additional major or minor in another department may submit a petition to waive the units requirement for Statistics; contact Human Biology student services for more information. Students who did not declare before September 21, 2015, may not use STATS 60 to fulfill the statistics requirement.	
Additional Information	
Capstone (1-10 units)	
The following options fulfill the Capstone (https://humanbiology.stanford.edu/capstone/) requirement:	
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Students can take workshops over several quarters, and enroll in one unit of 191 for the quarter they plan to complete the practicum.

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3. *Honors in Human Biology (by application)*: HUMBIO 194 Honors also satisfies the Capstone requirement.
4. Non-Human Biology activities that fulfill the Capstone requirement:
 - a. Notation in Science Communication
 - b. Interdisciplinary Honors

Breadth and Depth Requirement

These courses inform the student's chosen area of concentration topic. The student selects courses for these two requirement categories in consultation with the advising staff, who approve the final course selections. A Human Biology area of concentration topic generally falls within one (or a combination of 2) of the following areas of emphasis:

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Upper-Division Requirement

Students must take three Human Biology upper-division courses numbered 100 to 189. These courses should be used to explore subjects outside the depth requirement. One upper-division course may be taken satisfactory/no credit. Each course must be taken for a minimum of 3 units. Minimum grade requirement for upper-division courses is 'C-'. All non-laboratory advanced HUMBIO courses (those numbered 100 to 189) fulfill the Human Biology upper-division requirement. A list of Overseas Studies courses that satisfy upper-division requirements can be found on the Overseas tab (p. 7) of this section of this bulletin.

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Students may apply to the honors program if they have completed the Human Biology core with a minimum GPA of 3.0, have an overall Stanford GPA of 3.2, and meet other requirements detailed in the honors handbook. Interested students should consult the Human Biology Honors website (<http://humanbiology.stanford.edu/academics/honors/>) and meet with the Human Biology Associate Director or student services officer.

Most honors projects involve a total of 10-15 units of course work in HUMBIO 193 and 194:

		Units
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HUMBIO 194	Honors	1-10

Admission to the honors program is by preliminary application in early February, followed by the full application in early March of the junior year. Students planning to undertake honors begin research or preparation as early as completion of the sophomore year.

The honors thesis is normally completed by the middle of Spring Quarter of the senior year. Honors students present summaries of their research at the Human Biology Senior Symposium in May.

Human Biology also holds a Summer Honors College just prior to Autumn Quarter each year for students who have applied to the honors program. Students apply to Summer Honors College in April of the junior year.

Minor in Human Biology

A minor in Human Biology provides students with an introduction to the relationship between the biological and social aspects of humanity's origin, development, and future. Many of the serious problems facing humans today involve both biological and social aspects. Scientific approaches to these problems are essential, but they must be broadly conceived and placed within their proper social and cultural setting. Students with a minor in Human Biology are expected to develop a strong content background and the skills to integrate the biological and social aspects of human beings.

The Human Biology minor requires at minimum three core courses to ensure coverage of the field disciplines, while offering flexibility for students pursuing specific subplans in the fields of Global Health, Epidemiology, or Health Policy.

- The Global Health subplan introduces students to critical social perspectives, policy, and applications in global health.
- The Epidemiology subplan introduces students to epidemiological constructs and applies these methods to the study of real world public health challenges.
- The Health Policy subplan introduces students to population-level problems, interventions, and policy in public health.

Students declaring a minor in Human Biology must do so no later than two quarters prior to their intended quarter of degree conferral (for example, a student must declare a minor before the end of Autumn Quarter if graduating in the following Spring Quarter). Students who declared a minor prior to September 2018 should refer to previous guidelines and requirements for the minor and if interested in a subplan should contact HumBio Student Services by emailing humbioadvising@stanford.edu to determine eligibility. Undergraduate fields of study (subplans) are declared on ACESS; these subplans appear on the transcript but not on the diploma. Students may submit a petition to declare the HumBio minor without a subplan; contact Human Biology Student Services for more information.

In order to graduate with a minor in Human Biology, undergraduates must complete the minor program of study as described here, for a total of at least 25 units, with a minimum of six courses.

Degree Requirements

Students completing a major that requires some of the HumBio Core or equivalent may submit a petition to substitute the Core requirement; contact Human Biology Student Services for more information.

Course Requirements

		Units
Human Biology Core		15
Complete three courses from (at least one A-side and at least one B-side class):		
HUMBIO 2A	Genetics, Evolution, and Ecology	
HUMBIO 2B	Culture, Evolution, and Society	
HUMBIO 3A	Cell and Developmental Biology	
HUMBIO 3B	Environmental and Health Policy Analysis	
HUMBIO 4A	The Human Organism	
HUMBIO 4B	Behavior, Health, and Development	
Electives		10
Three (3) elective courses, each 3 or more units, totaling 10 or more units, within the chosen subplan. A comprehensive list of suitable elective courses is provided below.		
Global Health Subplan Electives		
HUMBIO 114	Global Change and Emerging Infectious Disease	
HUMBIO 122M	Challenges of Human Migration: Health and Health Care of Migrants and Autochthonous Populations	
HUMBIO 124C	Global Child Health	
HUMBIO 129S	Global Public Health	
HUMBIO 129W	Health Care Systems Around the World	
HUMBIO 153	Parasites and Pestilence: Infectious Public Health Challenges	
HUMBIO 154D	Models for Understanding and Controlling Global Infectious Diseases	
HUMBIO 179B	Music and Healing	
HUMBIO 26	Designing Research-Based Interventions to Solve Global Health Problems	
AFRICAAM 41	Genes and Identity	
ANTHRO 182N	Smoke and Mirrors in Global Health	
COMP MED 84Q	Globally Emerging Zoonotic Diseases	
EARTHSYS 162	Data for Sustainable Development	
EASTASN 117	Health and Healthcare Systems in East Asia	
HISTORY 243G	Tobacco and Health in World History	
EPI 231	Epidemiology of Infectious Diseases	
EPI 237	Practical Approaches to Global Health Research	
HUMRTS 110	Global Women's Issues in Human Rights and Health	
MED 232	Global Health: Scaling Health Technology Innovations in Low Resource Settings	
PEDS 223	Human Rights and Global Health	
SOMGEN 207	Theories of Change in Global Health	
Epidemiology Subplan Electives		
HUMBIO 57	Epidemic Intelligence: How to Identify, Investigate and Interrupt Outbreaks of Disease	
HUMBIO 114	Global Change and Emerging Infectious Disease	
HUMBIO 126	Promoting Health Over the Life Course: the Science of Healthy Living	
HUMBIO 153	Parasites and Pestilence: Infectious Public Health Challenges	
HUMBIO 154B	Principles of Epidemiology	
HUMBIO 154C	Cancer Epidemiology	

HUMBIO 154D	Models for Understanding and Controlling Global Infectious Diseases
HUMBIO 159	Genes and Environment in Disease Causation: Implications for Medicine and Public Health
COMP MED 84Q	Globally Emerging Zoonotic Diseases
EPI 206	Meta-research: Appraising Research Findings, Bias, and Meta-analysis
EPI 219	Evaluating Technologies for Diagnosis, Prediction and Screening
EPI 225	Introduction to Epidemiologic and Clinical Research Methods
EPI 231	Epidemiology of Infectious Diseases
EPI 259	Introduction to Probability and Statistics for Epidemiology
EPI 261	Intermediate Biostatistics: Analysis of Discrete Data
Health Policy Subplan Electives	
HUMBIO 120	Health Care in America: An Introduction to U.S. Health Policy
HUMBIO 120A	American Health Policy
HUMBIO 122A	Health Care Policy and Reform
HUMBIO 123E	Health Economics & Policy: exploring health disparities, child health & health care spending
HUMBIO 129W	Health Care Systems Around the World
HUMBIO 153	Parasites and Pestilence: Infectious Public Health Challenges
EASTASN 117	Health and Healthcare Systems in East Asia
HRP 211	Law and Biosciences: Neuroscience
HRP 221	Law and the Biosciences: Genetics
HRP 249	Topics in Health Economics I
HRP 256	Economics of Health and Medical Care
HRP 252	Outcomes Analysis
MS&E 292	Health Policy Modeling
PUBLPOL 156	Health Care Policy and Reform
PUBLPOL 231	Health Law: Finance and Insurance
SOC 152	The Social Determinants of Health

Additional Information

Course work completed for the Human Biology Minor must meet the following criteria:

- All courses must be taken for a letter grade.
- All courses must be completed with a minimum 'C-' grade.
- Courses used to fulfill the minor may not be used to fulfill any other department degree requirements (major or minor).
- All courses must be taken at Stanford University.

COVID-19 Policies

On July 30, the Academic Senate adopted grading policies effective for all undergraduate and graduate programs, excepting the professional Graduate School of Business, School of Law, and the School of Medicine M.D. Program. For a complete list of those and other academic policies relating to the pandemic, see the "COVID-19 and Academic Continuity (<http://exploreddegrees.stanford.edu/covid-19-policy-changes/#tempdeptemplatetabtext>)" section of this bulletin.

The Senate decided that all undergraduate and graduate courses offered for a letter grade must also offer students the option of taking the

course for a “credit” or “no credit” grade and recommended that deans, departments, and programs consider adopting local policies to count courses taken for a “credit” or “satisfactory” grade toward the fulfillment of degree-program requirements and/or alter program requirements as appropriate.

Undergraduate Degree Requirements

Grading

The Program in Human Biology counts all courses taken in academic year 2020-21 with a grade of ‘CR’ (credit) or ‘S’ (satisfactory) towards satisfaction of undergraduate degree requirements that otherwise require a letter grade.

Director: Lianne Kurina

Associate Director: Katherine Preston

Director of Undergraduate Studies: Lianne Kurina

Honors Chair: Katherine Preston

Emeriti: (Professors) Carol Boggs (Biology), Donna Bouley (Comparative Medicine), Doug Brutlag (Biochemistry), William H. Durham (Anthropology), Anne Fernald (Psychology), Russell D. Fernald (Biology), Ronald Garcia (Center for Excellence), A. Dale Kaiser (Development Biology/Biochemistry) - in memoriam, Herant Katchadourian (Human Biology), Donald Kennedy (Biology) - in memoriam, Michael Marmor (Ophthalmology), Gordon Matheson (Orthopaedic Surgery/Sports Medicine), Ellen FitzSimmons Porzig (Developmental Biology), Carol Winograd (Medicine)

Professors: Julie C. Baker (Genetics), Laurence Baker (Health Research and Policy - Health Services Research), Laura Carstensen (Psychology), Tiffany Chao (Surgery - General Surgery), Rodolfo Dirzo (Biology), Heidi Feldman (Pediatrics/Developmental Behavioral Pediatrics), Paul Fisher (Neurology) - on leave (Autumn), Margaret Fuller (Developmental Biology), Gary Gold (Radiology/Musculoskeletal Imaging), Brenda Golianu (Anesthesiology, Perioperative and Pain Medicine - Pediatrics), Lawrence H. Goulder (Economics), James J. Gross (Psychology), Joachim Hallmayer (Psychiatry and Behavioral Sciences - Child and Adolescent Psychiatry and Child Development), H. Craig Heller (Biology), Jill Helms (Surgery - Plastic and Reconstructive Surgery), Richard Klein (Anthropology and Biology), Tanya Luhrmann (Anthropology), Yvonne Maldonado (Pediatrics - Infectious Diseases/Health Research and Policy), Roeland Nusse (Developmental Biology), Ruth O'Hara (Psychiatry and Behavioral Sciences/Public Mental Health and Population Sciences), Michael Ostacher (Psychiatry and Behavioral Sciences/Public Mental Health and Population Sciences), Amado Padilla (Education), Julie Parsonnet (Medicine/Infectious Diseases), Rob Reich (Political Science), Allan Reiss (Psychology and Behavior Sciences - Center for Interdisciplinary Brain Sciences Research/Radiology), Robert Sapolsky (Biology, Neurology and Neurological Sciences, Neurosurgery), Walter Scheidel (Classics and History), Sara Singer (Medicine/Primary Care and Population Health), Randall Stafford (Medicine/Stanford Center for Research in Disease Prevention), William Talbot (Developmental Biology), Shripad Tuljapurkar (Biology), Jeffrey Wine (Psychology)

Associate Professors: Michael C. Frank (Psychology), Duana Fullwiley (Anthropology), Angela Garcia (Anthropology), Jeremy Goldhaber-Fiebert (Medicine/Primary Care and Outcomes Research), Peter Kao (Medicine/Pulmonary and Critical Care Medicine), N. Grant Miller (Medicine/Primary Care and Outcomes Research), Michelle Monje-Deisseroth (Neurology), Jelena Obradovic (Education), Jonathan Pritchard (Biology and Genetics), Lee Sanders (Pediatrics - General Pediatrics), Aliya Saperstein (Sociology), Gavin Sherlock (Genetics)

Assistant Professors: Geoffrey Abrams (Orthopaedic Surgery), Jorah Dannenberg (Philosophy), Denise Gill (Music – Ethnomusicology), Roanne Kantor (English) - maternity leave, Anshul Kundaje (Genetics and Computer Science), Michelle Monje-Deisseroth (Neurology), Maria Polyakova (Health Research and Policy - Health Services Research), Maya Rossin-Slater (Health Research and Policy - Health Services Research),

Professors (Research): Christopher Gardner (Medicine - Stanford Prevention Research Center), David Lyons (Psychiatry and Behavioral Sciences/General Psychiatry and Psychology - Adult), Marcia Stefanick (Medicine - Stanford Prevention Research Center/Obstetrics and Gynecology)

Associate Professors (Research): Philippe Mourrain (Psychiatry and Behavioral Sciences – Sleep Disorder/Stanford Center for Sleep Sciences and Medicine), Karen Parker (Psychiatry and Behavioral Sciences), Lisa Goldman Rosas (Health Research and Policy - Epidemiology; Medicine/Primary Care and Population Health), Jamie Zeitzer (Psychiatry and Behavioral Sciences - Stanford Center for Sleep Sciences and Medicine)

Professors (Teaching): Donald Barr (Pediatrics - General Pediatrics), Gary Darmstadt (Pediatrics - Neonatology), Ronald Davis (Biochemistry/Genetics), David Magnus (Pediatrics/SCBE), John Oppenshaw (Medicine/Infectious Diseases), Robert Siegel (Microbiology and Immunology)

Associate Professors (Teaching): Jason Andrews (Medicine/Infectious Diseases), Catherine Heaney (Psychology/Medicine - Stanford Prevention Research Center), Lianne Kurina (Medicine/Primary Care and Population Health), Eunice Rodriguez (Pediatrics - General Pediatrics), Kristin Sainani (Health Research and Policy – Epidemiology)

Clinical Assistant Professors: Moises Gallegos (Emergency Medicine), Jason Hom (Medicine), Andrea Kussman (Orthopaedic Surgery), Daniel Mason (Psychiatry), Margaret Windy Mc Nerney (VA Palo Alto Health Care Services), Rita Popat (Health Research and Policy – Epidemiology)

Clinical Associate Professor: Cynthia Nguyen (Psychiatry and Behavioral Sciences), Clea Sarnquist (Pediatrics - Infectious Diseases)

Other Teaching Faculty and Staff: Tamar Brand-Perez, David Crane (Public Policy), Judy Chu, Sophia Colamarino (Psychiatry and Behavioral Sciences - Child and Adolescent Psychiatry and Child Development), Anne Friedlander, Renu Heller (Biology), Catherine Ley (Medicine/Infectious Diseases), Mark Mabry, Lisa Medoff, Joe Nation (Public Policy), Katherine Preston, Annette Salmeen, Piya Sorcar (Center for Health Policy and the Center for Primary Care and Outcomes Research), Jennifer Wolf (Education)

Course Associates: Abby Chen, Courtney Gao, Ginger Gramson, Sierra Maciorowski, Alessandra Marcone, Cameron Nosrat, Paul Phan, Caroline Zha

Overseas Studies Courses in Human Biology

The Bing Overseas Studies Program (<http://bosp.stanford.edu>) (BOSP) manages Stanford international and domestic study away programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The BOSP course search site (<https://undergrad.stanford.edu/programs/bosp/explore/search-courses/>) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://bosp.stanford.edu>).

Due to COVID-19, all BOSP programs have been suspended for Autumn Quarter 2020-21. All courses and quarters of operation are subject to change.

		Units
OSPAUSTL 10	Coral Reef Ecosystems	3
OSPAUSTL 28	Terrestrial Ecology and Conservation	3
OSPAUSTL 32	Coastal Ecosystems	3
OSPCPTWN 67	ICT4D: An Introduction to the Use of ICTs for Development	3
OSPHONGK 44	Medical Sociology	4
OSPMADRD 57	Health Care: A Contrastive Analysis between Spain and the U.S.	4
OSPMADRD 72	Issues in Bioethics Across Cultures	4
OSPPARIS 76	From Art to Medicine: The Human Body and Tissue Regeneration	3

Courses

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 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 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 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

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 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 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 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 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 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 ζ or are collecting ζ 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 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 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. Prerequisites: 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.