

# SCHOOL OF MEDICINE

Dean: Philip Pizzo

Senior Associate Dean for Graduate Education and Postdoctoral

Affairs: John Pringle

Senior Associate Dean for Medical Student Education: Charles Prober

The School of Medicine offers courses of study leading to the M.S., Ph.D., and M.D. degrees.

## UNDERGRADUATE PROGRAMS IN THE SCHOOL OF MEDICINE

---

At the undergraduate level, a number of the school's courses are open to any registered Stanford student who has fulfilled the prerequisites, subject to the usual limits of course enrollment and faculty approval. In the classroom, the school offers courses targeted to undergraduates as well as graduate-level courses where advanced undergraduates with a strong background in the life sciences are welcome. Among these offerings are Stanford Introductory Seminars for freshmen and sophomores; interested students are encouraged to peruse the complete list of these offerings in the "Stanford Introductory Seminars" section of this bulletin or at <http://www.stanford.edu/group/introsems>.

## GRADUATE PROGRAMS IN THE SCHOOL OF MEDICINE

---

### M.S. AND PH.D. PROGRAMS IN THE SCHOOL OF MEDICINE

The School of Medicine is home to graduate programs covering a broad range of disciplines within biomedicine leading to Ph.D. or M.S. degrees. These programs focus on interdisciplinary training with in-depth investigation of an original problem of fundamental importance to bioscience. Each degree program sets its own curriculum, but many courses are taught by groups of faculty from multiple programs and departments. Flexibility is a priority to ensure that all students obtain the best possible training for pursuing careers in their areas of interest. Admission is through one of about 15 home programs. These home programs enable students to carry out dissertation research and training with School of Medicine faculty, as well as investigators in the departments of Biology and Biophysics in the School of Humanities and Sciences. Detailed information on School of Medicine M.S. and Ph.D. programs, curricula, and research can be found at <http://med.stanford.edu/ms> and <http://med.stanford.edu/phd>. Application information may be obtained from Graduate Admissions, Office of the University Registrar, Stanford University, 630 Serra Street, Suite 120, Stanford, CA 94305-6032, or at <http://gradadmissions.stanford.edu>.

### M.D. PROGRAM IN THE SCHOOL OF MEDICINE

The School of Medicine seeks to attract students who are passionate about scholarship and wish to improve the health of the world's people through research, innovation, and leadership. The Stanford M.D. curriculum provides education in biomedical and clinical sciences along with study and independent research through scholarly concentrations. Emphasis is placed on interdisciplinary learning, with streamlined content and melding of basic science and

clinical instruction across the curriculum. Blocks of unscheduled time allow for individual or group study, participation in elective courses, research, and reflection. Alternative pathways through the curriculum include an option of a fifth or sixth year of study, and opportunities for pursuing a second degree, such as an M.P.H. or Ph.D.

Broad clinical science education occurs throughout the curriculum with exposure to patient care and the practice of medicine beginning on the first day of medical school. Students may begin clinical clerkships as early as May of the second year. A population health course combines classroom and experiential learning to provide understanding of the socioeconomic determinants of the health of patients and communities.

Scholarly concentrations offer opportunities for developing skills that enhance basic science and clinical training in areas such as bioengineering, biomedical ethics and medical humanities, biomedical informatics, clinical research, community health, health services and policy research, and the molecular basis of medicine. Through the scholarly concentration program, these skills may be applied in clinical areas housed within centers at Stanford such as the Comprehensive Cancer Center, the Cardiovascular Institute, the Neuroscience Institute, the Institute of Immunity, Transplantation, and Infection, and Women's Health at Stanford. Study in a scholarly concentration typically includes course work and research activities. Research for scholarly concentrations can be supported through the Medical Scholars program, which funds student research projects at Stanford and overseas.

Students with interests in medical research as a career are encouraged to investigate opportunities available through the Medical Scientist Training Program (MSTP). Stanford also collaborates with the University of California, Berkeley, to offer students opportunities for M.D./M.P.H. training. Details about these programs may be found at [http://med.stanford.edu/combined\\_degree](http://med.stanford.edu/combined_degree).

Stanford is committed to representing the diversity of the U.S. and California populations by seeking a diverse body of students who are interested in the intellectual substance of medicine and committed to advancing the field of health care, broadly defined. Provided an applicant to the school has completed basic courses in physics, chemistry, and biology, the choice of an undergraduate major may reflect other interests, including the arts and humanities. Course work in advanced biology such as biochemistry, molecular biology, or genetics and the behavioral sciences is recommended because of their importance in understanding health care. Breadth of interests and depth of experiences play an important role in the selection of students from among those applicants having superior academic records.

The M.D. degree requires 13 quarters of full tuition; the joint M.D./Ph.D. degree requires 16 quarters. All additional quarters are charged at the reduced Terminal Medical Registration (TMR) tuition rate, which is \$2,169 per quarter in 2008-09. Completion of the M.D. degree must be achieved within six years, unless a petition is granted to extend this time frame. For further details on the M.D. degree, including admission requirements, see <http://med.stanford.edu/md>.

### MULTIPLE-DEGREE PROGRAMS IN THE SCHOOL OF MEDICINE

#### MEDICAL SCIENTIST TRAINING PROGRAM

The Medical Science Training Program (MSTP) provides medical students with an opportunity to pursue an individualized program of research and course work leading to both the M.D. and Ph.D. degrees. It is designed to equip students for careers in academic investigative medicine, and emphasizes individualization of curricular and research programs for each trainee. Training for a combined M.D./Ph.D. should include the same content encountered by students who pursue each degree separately, but the total training time should be less than the sum of the time normally required for each degree. The flexible curriculum at Stanford's School of Medicine allows each student, in consultation with a preceptor and other advisers, to pursue a plan of study that satisfies the requirements for the M.D. degree and allows performance of doctoral-level research leading to the Ph.D. Students interested in joining the MSTP are considered for admission at the time of their application to the School of Medicine M.D. program and are asked to provide supplemental information relevant to their research

background. Current Stanford M.D. students may also apply for admission to the MSTP. Further information regarding admission may be obtained from the MSTP administrator; details about the MSTP may be found at <http://mstp.stanford.edu>.

### MASTER OF SCIENCE IN MEDICINE PROGRAM

The Master of Science in Medicine program admits Ph.D. students who have a commitment to translational research, but are not interested in becoming clinicians. The goal of the program is to train researchers in human biology and disease so they are more able to translate new scientific discoveries into useful medical advances. Students offered admission into any Ph.D. program at Stanford may apply for admission to the master's program. During their first five quarters, students take basic biomedical science courses with Stanford M.D. students. The School of Medicine M.D. curriculum is presented in a succinct format that allows time for students to concurrently complete their Ph.D. course requirements and lab rotations. By early in their second year, students choose a lab for their Ph.D. thesis research and complete their medical course work. They also elect a clinical mentor to discuss translational research needs and help to arrange a short clinical experience. Upon completion of the Ph.D., participating students receive an M.S. in Medicine. Details about the program can be found at <http://msm.stanford.edu>.

## MEDICINE (MED) COURSES

---

See the "School of Medicine" section of this bulletin for more information. The following courses are available to undergraduates or graduate students. Other courses may be available; see <http://www.med.stanford.edu/education> for more information.

### UNDERGRADUATE COURSES IN MEDICINE

#### MED 70Q. Cancer and the Immune System

Stanford Introductory Seminar. Preference to sophomores. Myths and facts surrounding the idea that the immune system is capable of recognizing malignant cells. The biological basis and function of effector arms of the immune system; how these mechanisms may be used to investigate the biological basis and potential therapy of cancer. How the immune system functions.

3 units, Spr (Negrin, R)

#### MED 83Q. Ethical, Legal, and Social Dimensions of Stem Cell Research

Stanford Introductory Seminar. Preference to sophomores. Ethical, legal, social, and economic dimensions of stem cell research such as the discovery of human embryonic stem cells and the international landscape of public policy. How stem cells work, their role in the upkeep of the human body, and current and future uses in medicine. Issues at the intersection of science and society such as human-animal hybrids, notions of justice in intellectual property law, distribution of health care, and the major ethical frameworks defining the debate.

3 units, Spr (Scott, C)

#### MED 86Q. Seeing the Heart

(F,Dial) Stanford Introductory Seminar. Introduction to biomedical technology, science, clinical medicine, and public policy through cardiovascular imaging. Invasive and noninvasive techniques to detect early stage heart disease and to see inside the heart and blood vessels. Topics include: common forms of heart disease, how they develop, and why they affect so many people; imaging technologies such as ultrasound, CT, MRI, PET, and optical; a cost-effective public screening program. Field trips to Stanford Medical Center imaging centers.

2 units, Win (McConnell, M)

#### MED 87Q. Women and Aging

(S,Sem Same as HUMBIO 87Q.) Stanford Introductory Seminar. Preference to sophomores. Biology, clinical issues, social and health policies of aging; relationships, lifestyles, and sexuality; wise women and grandmothers. Sources include scientific articles, essays, poetry, art, and film. Service-learning experience with older women. GER:EC-Gender

5 units, Win (Winograd, C)

#### MED 88Q. Dilemmas in Current Medical Practice

Stanford Introductory Seminar. Preference to sophomores. Social, political, scientific, and economic forces influencing medical practice. Spiraling costs, impaired access to health care, and disillusionment toward the health care system. Attempts by government and medical insurers to control costs through managed care and health maintenance organizations. Medical education and how it has affected the practice of medicine. Alternative health care, preventive medicine, and the doctor-patient relationship. The paradox of health in America: why do so many people who are healthy feel unhealthy? Optional observation of instructors in their medical practices.

3 units, Aut (Croke, J; Jones, H)

#### MED 93Q. The AIDS Epidemic: Biology, Behavior, and Global Responses

Stanford Introductory Seminar. Preference to sophomores. How the discovery of the causative agent and the modes of transmission of HIV fueled a quest for prevention, treatments, and a vaccine. Discoveries in biology, biotechnology, epidemiology, and medicine during the last 20 years. Hypotheses about the origins of HIV as a human disease; the spread of AIDS and HIV; social, political, and economic consequences of the epidemic; and national and global responses.

3 units, Aut (Katzenstein, D)

#### MED 94Q. Hormones, Health, and Disease

Preference to sophomores. Hormones' roles in maintaining health; how abnormalities in hormones cause disease. Topics include: the pituitary, the master gland; thyroid hormones and metabolism; insulin and diabetes; adrenal steroids and hypertension; vitamin D, parathyroid hormone, calcium, and osteoporosis; sex hormones, birth control, pregnancy, and menopause; androgens, erectile dysfunction, and athletic performance; cholesterol, obesity, and cardiovascular risk. Recommended: background in human biology and physiology.

3 units, not given this year

#### MED 108Q. Human Rights and Health

Stanford Introductory Seminar. Preference to sophomores. History of human-rights law. Topics such as: the health status of refugees and internally displaced persons; child labor; trafficking in women and children; torture; poverty, the environment, and health; access to clean water; domestic violence and sexual assault; and international availability of drugs. International conventions on human rights as background for social and political changes that could improve the health of groups and individuals. Optional opportunities to observe at sites where human rights and health are issues.

3 units, Win (Laws, A)

#### MED 118Q. Pathophysiology of Coronary Heart Disease

Preference to sophomores. Known factors promoting the atherosclerotic process, and the pathologic changes that characterize clinical coronary artery disease. The development of arterial disease and the consequences of coronary occlusion, including heart attack, cardiac rhythm disturbance, and congestive heart failure. Treatment modalities such as cardiac medications, coronary surgery, and angioplasty.

3 units, not given this year

#### MED 120Q. Pathophysiology and Treatment Aspects of Diseases of the Heart and Blood Vessels

Preference to sophomores. Anatomic, physiologic, and pathologic states that comprise the discipline of cardiovascular medicine. Anatomy and physiology of the heart and blood vessels as an introduction to pathologic states such as heart attack, stroke, congestive heart failure, rhythm disturbances of the heart, and sudden cardiac death. Underlying principles of diagnosis and treatment of the disease.

3 units, not given this year

**MED 147. Methods in Community Assessment, Evaluation, and Research**

(Same as MED 247.) Development of pragmatic skills for design, implementation, and analysis of structured interviews, focus groups, survey questionnaires, and field observations. Topics include: principles of community-based participatory research, including importance of dissemination; strengths and limitations of different study designs; validity and reliability; construction of interview and focus group questions; techniques for moderating focus groups; content analysis of qualitative data; survey questionnaire design; and interpretation of commonly-used statistical analyses.

3 units, Win (Kiernan, M; Fortmann, S)

**MED 160. Physician Shadowing: Stanford Immersion in Medicine Series (SIMS)**

Undergraduates are paired with a physician mentor at Stanford Hospital and Clinics, Lucile Packard Children's Hospital, or the Veteran's Administration Hospital. May be repeated for credit. Prerequisite: Application and acceptance to the SIMS program.

1 unit, Aut (Gesundheit, N; Fox, E), Win (Gesundheit, N; Fox, E), Spr (Gesundheit, N; Fox, E)

**MED 199. Undergraduate Research**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

**GRADUATE COURSES IN MEDICINE**

Primarily for graduate students; undergraduates may enroll with consent of instructor.

**MED 207. History of Medicine**

Weekly lectures that trace the development of Western medical tradition from Babylonian, Egyptian, and Greek ancient cultures to the present.

1 unit, Win (Camargo, C)

**MED 217. Technological Frontiers in Digestive Diseases**

Focused on introducing engineering, bioengineering, and physical sciences students to technologies used in the clinical setting. Topics include: endoscopes to detect and remove cancer; minimally invasive surgery to treat obesity; measurements of propulsion through the intestine; and technologies to detect and stop internal bleeding. Observations in the clinical setting; visits to laboratories engaged in the development of new technologies.

2 units, Spr (Lowe, A; Milroy, J)

**MED 227. Bedside Ultrasound**

For pre-clinical or clinical medical students, and others with permission. Uses of ultrasound (US) at the bedside. Portable US machines (now the size of laptop computers) are used. How to identify the normal anatomy of the heart, abdomen, and pelvis using US. As proficiency increases, patients with abnormal physical findings are examined at the bedside, enabling students to compare the traditional physical examination with information obtained during US. The syllabus, Introduction to the Physical Examination with Diagnostic Ultrasound (2001), written by Drs. Wolfe and Thompson is used as the students' guide.

1 unit, Aut (Thompson, N; Liang, D), Win (Thompson, N; Liang, D), Spr (Thompson, N; Liang, D)

**MED 228. Physicians and Social Responsibility**

Social and political context of the roles of physicians and health professionals' role in social change; policy, advocacy, and shaping public attitudes. How physicians have influenced governmental policy on nuclear arms proliferation; environmental health concerns; domestic violence; health and human rights; physicians in government; activism through research; the effects of poverty on health; and gun violence.

1 unit, Aut (Laws, A)

**MED 230. Rethinking International Health**

(Same as HRP 240.) Issues and players that shape international health today. How to develop a road map for thoughtful, responsible action. Topics include: the role of the physician and health care worker; health as a human right; successful interventions; children's and women's health; issues in immunization; economic development; and NGOs. Online interviews with influential leaders in international health.

2-3 units, Spr (Parsonnet, J)

**MED 236. Psychosocial and Behavioral Health Interventions**

For medical students, graduate students and undergraduates with senior standing in Human Biology or Psychology. Contemporary theory and conceptual frameworks for psychosocial and behavioral change interventions as applied in contemporary models of community medicine. The trans-theoretical model of behavioral change, contemporary behavioral, cognitive behavioral, social cognitive and acceptance-based models of behavioral change. Current models of emotion regulation, goal setting and attainment, and the impact of personality and characterological features on behavior and behavioral change. Application of theory in practicum based community clinic settings. Prerequisite: Stanford HIPAA training.

1 unit, not given this year

**MED 242. Physicians and Human Rights**

Weekly lectures on how human rights violations affect health. Topics include torture, domestic violence, regional conflict and health, sweat shops, rape, and war. Guest speakers.

1 unit, Win (Laws, A)

**MED 247. Methods in Community Assessment, Evaluation, and Research**

(Same as MED 147.) Development of pragmatic skills for design, implementation, and analysis of structured interviews, focus groups, survey questionnaires, and field observations. Topics include: principles of community-based participatory research, including importance of dissemination; strengths and limitations of different study designs; validity and reliability; construction of interview and focus group questions; techniques for moderating focus groups; content analysis of qualitative data; survey questionnaire design; and interpretation of commonly-used statistical analyses.

3 units, Win (Kiernan, M; Fortmann, S)

**MED 250A. Medical Ethics I**

Required for Scholarly Concentration in Biomedical Ethics and Medical Humanities. The field of bioethics, including theoretical approaches to bioethical problems. Contemporary controversies and clinical cases. Values that arise in different situations and clinical encounters. Issues include: genetics and stem cell research, rationing, ethical issues in care at the end of life, organ transplantation issues.

2 units, Win (Magnus, D)

**MED 250B. Medical Ethics II**

The integration of ethical theory with applications of theory or conceptual issues in medicine, health care, and the life and social sciences. Topic varies by year. Possible topics include: ethical issues in stem cell research; death and dying; genetics and ethics; concepts of health and disease; the ethics of international research; and ethical implications of new reproductive technology.

2 units, Spr (Magnus, D)

**MED 255. The Responsible Conduct of Research**

Forum. How to identify and approach ethical dilemmas that commonly arise in biomedical research. Issues in the practice of research such as in publication and interpretation of data, and issues raised by academic/industry ties. Contemporary debates at the interface of biomedical science and society regarding research on stem cells, bioweapons, genetic testing, human subjects, and vertebrate animals. Completion fulfills NIH/ADAMHA requirement for instruction in the ethical conduct of research. Recommended: research experience.

1 unit, Aut (Karkazis, K), Win (Karkazis, K), Spr (Staff)

**MED 256. Global HIV/AIDS**

(Same as HUMBIO 156.) Public health, policy, and research issues. Resources at Stanford and institutions such as government, NGOs, and pharmaceutical, advocacy, and international organizations. Sources include biomedical, social, and behavioral sciences. Student projects. Guest lectures. Prerequisite: Human Biology core or equivalent, or consent of instructor.

*3 units, Spr (Katzenstein, D)*

**MED 257A. Patient Advocacy in Community Clinics**

Early clinical experience for pre-medical and medical students. Structured training and shadowing in preparation for a clinical role working with patients in community health clinics; the context of the work, populations served, and social role of physicians. Regular shifts at a course-affiliated clinic site throughout the academic year. 1-2 units for students attending class meetings and performing clinic shifts. 3-4 units for a year-long, clinic-based project. Prerequisite: application.

*1-4 units, Aut (Garcia, G; Banchoff, A)*

**MED 257B. Patient Advocacy in Community Clinics**

Early clinical experience for pre-medical and medical students. Structured training and shadowing in preparation for a clinical role working with patients in community health clinics; the context of the work, populations served, and social role of physicians. Regular shifts at one of the course-affiliated clinic sites throughout the academic year. 1-2 units for students attending class meetings and performing clinic shifts. 3-4 units for a year-long, clinic-based project. Prerequisite: MED 257A

*1-4 units, Win (Garcia, G; Banchoff, A)*

**MED 257C. Patient Advocacy in Community Clinics**

Early clinical experience for pre-medical and medical students. Structured training and shadowing in preparation for a clinical role working with patients in community health clinics; the context of the work, populations served, and social role of physicians. Regular shifts at one of the course-affiliated clinic sites throughout the academic year. 1-2 units for students attending class meetings and performing clinic shifts. 3-4 units for a year-long, clinic-based project. Prerequisite: 257A,B

*1-4 units, Spr (Garcia, G; Banchoff, A)*

**MED 258. Advanced Patient Advocacy in Community Clinics**

Continuation of 257A,B,C for second-year students in Patient Advocacy Program; open to students who have worked in a clinical capacity in a community clinic setting. Skills training in areas such as health education counseling and group facilitation. Regular shifts at partner clinics. Students partner with clinic staff in developing and carrying out a service-learning or research project designed to meet the clinic's needs. May be repeated for credit. Prerequisites: 257A,B,C or consent of instructor.

*1-3 units, Aut, Win, Spr, Sum (Garcia, G; Banchoff, A)*

**MED 259. Oaxacan Health on Both Sides of the Border**

Required for students participating in the Community Health in Oaxaca summer program. Health literacy and health-seeking behaviors of Oaxacan and other Mexican migrants; examines the health challenges these groups face. Through discussion and reflection, students prepare for clinical work and community engagement in Oaxaca, while also gaining knowledge and insight to make connections between their experiences in Mexico and their health-related work with Mexican immigrants in the Bay Area. Prerequisite: application and acceptance into the Community Health in Oaxaca Summer Program (<http://och.stanford.edu/oaxaca.html>).

*2 units, Spr (Garcia, G; Banchoff, A)*

**MED 262. Economics of Health Improvement in Developing Countries**

(Same as ECON 127.) Application of economic paradigms and empirical methods to health improvement in developing countries. Emphasis is on unifying analytic frameworks and evaluation of empirical evidence. How economic views differ from public health, medicine, and epidemiology; analytic paradigms for health and population change; the demand for health; the role of health in international development. Prerequisites: ECON 50 and 102B, and consent of instructor.

*5 units, Win (Staff)*

**MED 272A. Biodesign Innovation: Needs Finding and Concept Creation**

(Same as BIOE 374A, ME 368A.) Two quarter sequence. Inventing new medical devices and instrumentation, including: methods of validating medical needs; techniques for analyzing intellectual property; basics of regulatory (FDA) and reimbursement planning; brainstorming and early prototyping. Guest lecturers and practical demonstrations.

*2 units, Win (Yock, P; Zenios, S; Milroy, J; Brinton, T)*

**MED 272B. Biodesign Innovation: Concept Development and Implementation**

(Same as BIOE 374B, ME 368B.) Two quarter sequence. How to take a medical device invention forward from early concept to technology translation and development. Topics include prototyping; patent strategies; advanced planning for reimbursement and FDA approval; choosing translation route (licensing versus start-up); ethical issues including conflict of interest; fundraising approaches and cash requirements; essentials of writing a business or research plan; strategies for assembling a development team. Prerequisite: MED 272A/ME 368A/BIOE 374A.

*2 units, Spr (Yock, P; Zenios, S; Milroy, J; Brinton, T)*

**MED 273A. Biodesign Innovation, Project A**

(Same as BIOE 375A, ME 369A.) Interdisciplinary student teams select a medical need, characterize it fully, develop a needs statement, invent potential conceptual approaches to solving the need, and pursue initial prototyping and planning for regulatory and reimbursement pathways. Guest experts. Corequisite: MED 272A/BIOE 374A/ME 368A.

*2 units, Win (Yock, P; Zenios, S; Milroy, J; Brinton, T)*

**MED 273B. Biodesign Innovation, Project B**

(Same as BIOE 375B, ME 369B.) Interdisciplinary teams select the most promising invention from MED 273A/ME 369A/BIOE 375A and move into prototyping and project planning. Teams develop strategies for patenting, FDA submission, third-party reimbursement, licensing agreement or launching a start-up, including cash forecasting and business plan. Prerequisites: MED 375A/ME 369A/BIOE 375A. Corequisite: MED 272B/ME 368B/BIOE 374B.

*2 units, Spr (Yock, P; Milroy, J; Brinton, T; Zenios, S)*

**MED 275. Introduction Biopharmaceutical Innovation**

Open to all students. Biotechnology and the pharmaceutical industry. Topics include the biopharmaceutical industry, historical trends, and experiences; research and development; intellectual property; drug approval: regulatory issues and agencies; business development; marketing; manufacturing; capital structure and financing; careers in biopharmaceutical industry. 3 units requires team project and final presentation. May be repeated for credit.

*2-3 units, Win (Gardner, P)*

**MED 276. Careers in Medical Technology**

Career tracks in biomedical technology for medical, life science, engineering, business, and law students. Industry professionals describe career tracks, current roles, and industry perspectives.

*1 unit, Spr (Gardner, P; Lee, H)*

**MED 279Y. Interdisciplinary Design for Agile Aging**

(Same as CS 379Y, HUMBIO 131.) Offered by the d.school. Perspectives from computer science, design, social and behavioral sciences, physiology, geriatrics, and biodesign to develop projects that address the potential of people to maintain vitality and mobility as they age. New ways to integrate computer and device technologies with behavioral and social interventions. Focus is on small-group projects based on real-world need finding. Prerequisite: background in one of design, computing, medicine, behavioral sciences, communications, or business.

*3-4 units, Win (Winograd, C; Winograd, T; Friedlander, A; Yock, P)*

### **MED 279Z. Design Project for Agile Aging**

(Same as CS 379Z.) Second of two quarter sequence; students may take 379Y without 379Z; offered by the d.school. Small teams develop projects that can have an impact in the world through products, programs, and practices that affect people's health on a broad scale. Technical interventions, social and contextual design, organizational contexts, and business and distribution issues. Limited enrollment. Prerequisites: CS379Y, and master's level skills in one of design, computing, medicine, behavioral sciences, communications, or business.

*3-4 units, not given this year*

### **MED 289. Introduction to Bioengineering Research**

(Same as BIOE 390.) Preference to medical and bioengineering graduate students. Bioengineering is an interdisciplinary field that leverages the disciplines of biology, medicine, and engineering to understand living systems, and engineer biological systems and improve engineering designs and human and environmental health. Topics include: imaging; molecular, cell, and tissue engineering; biomechanics; biomedical computation; biochemical engineering; biosensors; and medical devices. Limited enrollment.

*1-2 units, Aut (Taylor, C), Win (Taylor, C)*

### **MED 298. Clinical Research in Carbohydrate and Lipid Metabolism**

Open to MD, graduate and undergraduate students. Students participate in research protocols associated with disorders of carbohydrate and lipid metabolism. Prerequisite: interview with the course director.

*3 units, Aut, Win, Spr, Sum (Reaven, G)*

### **MED 299. Directed Reading in Medicine**

Prerequisite: consent of instructor.

*1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)*

### **MED 399. Graduate Research**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

*1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)*

## MEDICINE INTERDISCIPLINARY (INDE) COURSES

See the "School of Medicine" section of this bulletin for more information.

### **UNDERGRADUATE COURSES IN MEDICINE INTERDISCIPLINARY**

#### **INDE 183I. Early Clinical Experience in International Family and Community Medicine**

(Same as INDE 283I. Graduate students register for 283I.) For preclinical medical students; undergraduates by special arrangement. Interactive early clinical experience with physicians, community leaders, health care workers, and patients in Mexico, India, China, or Tibet. Emphasis is on community health from local and global perspectives. Social, political, historical, and economic backgrounds of the country and local region. Non-western attitudes, beliefs and practices regarding health care, including herbal and other complementary medicine; local institutions and infrastructure including schools, social services, and the public health care system; and policies that impact health and the provision of care. Prerequisites: conversational Spanish for Mexico; for medical students, completion of first year; for undergraduates, junior standing or higher. Undergraduates apply through International Alliance in Service and Education (IASE) for Mexico; Volunteers in Asia (VIA) for Asian sites. Medical students

*6-12 units, Aut (LeBaron, S), Win (LeBaron, S), Spr (LeBaron, S), Sum (LeBaron, S)*

#### **INDE 199. Undergraduate Directed Reading and Research in Family and Community Medicine**

Interested students should contact the Center for Education in Family and Community Medicine administration. Prerequisite: consent of instructor.

*1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)*

### **GRADUATE COURSES IN MEDICINE INTERDISCIPLINARY**

Primarily for graduate students; undergraduates may enroll with consent of instructor.

#### **INDE 207A. Medical Mandarin I: Beginning**

Develops essential medical vocabularies and conversational communication skills. Teaches the pinyin pronunciation system, which provides an accessible method of learning basic phrases. The foundations of taking a comprehensive patient history in Mandarin and doing medical interviews at individual hospital divisions, including making introductions, soliciting symptoms, explaining health concepts (e.g. diseases and prescriptions). Main goals are to improve rapport with Chinese patients through Mandarin fluency in the medical setting and to promote understanding of Chinese culture in the context of health care. Students participating in classroom instruction only register for 1 unit. Students registering for 2 units participate in field activities as well.

*1-2 units, Aut (Wang, X; So, S)*

#### **INDE 207B. Medical Mandarin II: Intermediate**

For students who already have a basic command of spoken Chinese. Conversational communication skills practiced in a more advanced setting, including more sophisticated assessment of patient history and cultural components that influence diseases found in Chinese-speaking patients. Builds working vocabulary for organ system disease processes to conduct a full physical exam, and to describe treatment modalities for Chinese-speaking patients (diagnostic and therapeutic). Students participating in classroom instruction only register for 1 unit. Students registering for 2 units participate in field activities as well. Prerequisite: one semester of college-level Chinese or instructor assessment of fluency.

*1-2 units, Aut (Wang, X; So, S)*

#### **INDE 207C. Medical Mandarin III: Advanced**

Access advanced professional medical vocabulary, conduct medical research, and engage in discussions in Chinese. Aims at a proficiency level of medical interpreting or doing other independent work in Chinese. Students are also assisted in doing a project or projects related to a specific field of medicine. Students participating in classroom instruction only register for 1 unit. Students registering for 2 units participate in project activities as well. Prerequisite: Completion of Medical Mandarin II, or advanced Chinese proficiency.

*1-2 units, Aut (Wang, X; So, S)*

#### **INDE 208C. Medical Mandarin III: Advanced**

Access advanced professional medical vocabulary, conduct medical research, and engage in discussions in Chinese. Aims at a proficiency level of medical interpreting or doing other independent work in Chinese. Students are also assisted in doing a project or projects related to a specific field of medicine. Students participating in classroom instruction only register for 1 unit. Students registering for 2 units participate in project activities as well. Prerequisite: Completion of 207C, or advanced Chinese proficiency.

*1-2 units, Win (Wang, X; So, S)*

#### **INDE 209C. Medical Mandarin III: Advanced**

Access advanced professional medical vocabulary, conduct medical research, and engage in discussions in Chinese. Aims at a proficiency level of medical interpreting or doing other independent work in Chinese. Students are also assisted in doing a project or projects related to a specific field of medicine. Students participating in classroom instruction only register for 1 unit. Students registering for 2 units participate in project activities as well. Prerequisite: Completion of 208C or advanced Chinese proficiency.

*1-2 units, Spr (Wang, X; So, S)*

**INDE 212. The Human Condition: Medicine, Arts, and Humanities**

The interdisciplinary field of medical humanities: the use of the arts and humanities to examine medicine in personal, social, and cultural contexts. Topics include the doctor/patient relationship, the patient perspective, the meaning of doctoring, and the meaning of illness. Sources include visual and performing arts, film, and literary genres such as poetry, fiction, and scholarly writing. Designed for medical students in the Biomedical Ethics and Medical Humanities Scholarly Concentration, but all students are welcome.

2 units, Spr (Zaroff, L; Shafer, A)

**INDE 213. Medical Tai Chi**

Tai chi as a recognized form of complimentary and alternative medicine. Intended to promote student health and well-being and to decrease stress, depression, and anxiety through the practice of tai chi. Weekly practices under the instruction of world-renowned 20th generation tai chi expert, Master Shu Dong Li. Analysis of the literature regarding health benefits of tai chi.

2 units, Aut (Andrews, J; LeBaron, S), Win (Andrews, J; LeBaron, S), Spr (Andrews, J; LeBaron, S)

**INDE 226. History of Medicine Online**

Via Internet. Topics include: ancient medicine, Egypt and Babylonia, ancient Greece and Rome, Europe in the Middle Ages and the Renaissance, 18th-century schools of thought, and technological medicine. Sources include Kleinman's core clinical functions, and text, pictures, hypertext links, and sound clips. See <http://cwp.stanford.edu>.

1 unit, Aut (Shafer, A), Win (Shafer, A), Spr (Shafer, A)

**INDE 227. Careers in Medicine: Clinical Medicine and the Biomedical Sciences at the Cutting Edge**

Open to medical students, graduate and undergraduate students. Interactive, seminar-style sessions expose students to diverse career opportunities and the challenges of developing work-life balance in medicine. Recognized experts in clinical medicine and biomedical research who have been innovators in their careers discuss their work, decision-points in their career pathways, and lifestyle aspects of their choices.

1 unit, Spr (Gesundheit, N)

**INDE 238. Current Concepts and Dilemmas in Genetic Testing**

(Same as GENE 238.) Issues arising from the translational process from research to commercialization. Diagnostic inventions and applications, community implications, newborn screening, cancer genetics, and pharmacogenomics. Guest experts. For M.D., biomedical graduate, and genetic counseling students.

2 units, Spr (Tobin, S; Schrijver, I; Cowan, T; Magnus, D)

**INDE 244. Ethnicity and Medicine**

Weekly lecture series introduces basic information about ethnic and cultural factors that impact patient care. Presents information about culturally sensitive health care services and addresses contemporary research issues involving minority and underserved populations. Topics include health care issues and indigenous medical practices of African Americans, Asians, Latinos, Native Americans, immigrants and refugees in both urban and rural settings. One unit for weekly lectures only; two units require additional discussions facilitated by course director; three units (non-medical graduate students and undergraduates) require weekly response papers and a research paper.

1-3 units, Spr (Garcia, R)

**INDE 245. Women and Health Care**

Lecture and seminar series. Topics of interest to women as health care consumers and providers. The historical role of women in health care; current and future changes.

1-2 units, Aut (Grudzen, M; LeBaron, S; Massion, C)

**INDE 256. Current Controversies in Women's Health**

(Same as OBGYN 256, HUMBIO 125.) Interdisciplinary. Focus is on the U.S. Topics include: health research; bioethical, legal, and policy issues; scientific and cultural perspectives; social influences; environmental and lifestyle effects on health; and issues related to special populations. Guest lecturers; student debates. Prerequisite: Human Biology core or equivalent, or consent of instructor.

3 units, Spr (Jacobson, M; Stefanick, M)

**INDE 262A. Providing and Evaluating Health Education for Underserved Children**

(Same as HUMBIO 121A.) A service learning experience in community health. Students participate in developing health education materials for underserved middle school students based on principles of human biology and health science; become knowledgeable about logic modes and other evaluation tools available for evaluating health education modules and community interventions; develop an implementation and evaluation plan. Prerequisite for undergraduates: Human Biology core or equivalent or consent of instructor.

3 units, Aut (Rodriguez, E; Morioka-Douglas, N)

**INDE 262B. Providing and Evaluating Health Education for Underserved Children**

(Same as HUMBIO 121B.) Students implement the health education activities/modules developed in INDE 262A/HUMBIO 121A, solicit evaluative feedback, and present the outcomes.

3 units, Win (Rodriguez, E; Morioka-Douglas, N)

**INDE 283I. Early Clinical Experience in International Family and Community Medicine**

(Same as INDE 183I. Graduate students register for 283I.) For preclinical medical students; undergraduates by special arrangement. Interactive early clinical experience with physicians, community leaders, health care workers, and patients in Mexico, India, China, or Tibet. Emphasis is on community health from local and global perspectives. Social, political, historical, and economic backgrounds of the country and local region. Non-western attitudes, beliefs and practices regarding health care, including herbal and other complementary medicine; local institutions and infrastructure including schools, social services, and the public health care system; and policies that impact health and the provision of care. Prerequisites: conversational Spanish for Mexico; for medical students, completion of first year; for undergraduates, junior standing or higher. Undergraduates apply through International Alliance in Service and Education (IASE) for Mexico; Volunteers in Asia (VIA) for Asian sites. Medical students

6-12 units, Aut (LeBaron, S), Win (LeBaron, S), Spr (LeBaron, S), Sum (LeBaron, S)

## NEUROSURGERY (NSUR) COURSES

---

For information on graduate programs in Neurosurgery, see the "Neurosurgery" section of this bulletin.

### UNDERGRADUATE COURSES IN NEUROSURGERY

**NSUR 70Q. Experimental Stroke**

(F,Dial) Stanford Introductory Seminar. Preference to sophomores. How stroke is studied in the laboratory; advances in stroke research over the last two decades; and future directions. Topics include: cellular and molecular mechanisms of neuronal death and survival in the brain after stroke, including necrosis, apoptosis, inflammation, and cell signaling pathways; experimental tools for stroke treatment, such as gene therapy, cell therapy, hypothermia, preconditioning, postconditioning, and other pharmacological treatments; the gap and barrier between laboratory research and clinical translation.

2 units, Win (Zhao, H)

**NSUR 199. Undergraduate Research**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

## GRADUATE COURSES IN NEUROSURGERY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

**NSUR 261. Principles and Practice of Stem Cell Engineering**  
(Same as BIOE 261.) Quantitative models used to characterize incorporation of new cells into existing tissues emphasizing pluripotent cells such as embryonic and neural stem cells. Molecular methods to control stem cell decisions to self-renew, differentiate, die, or become quiescent. Practical, industrial, and ethical aspects of stem cell technology application. Final projects: team-reviewed grants and business proposals.

3 units, Aut (Deisseroth, K; Palmer, T)

### **NSUR 278A. From Science to Business: Innovation in Neurologic Disease Beyond Neurosurgery**

For medical, business, and engineering students. The process of innovation and company building in the medical field, emphasizing the neurosciences. Overview of neurological diseases; business and regulatory aspects of device and biotech product development. Guest speakers on healthcare entrepreneurship. Venture capital and entrepreneurial mentors guide interdisciplinary student teams in evaluating a solution to an unmet clinical need or a project within a biotech company. May be taken for 2 units without the team project.

2-4 units, alternate years, not given this year

### **NSUR 278B. Independent Study on Healthcare Innovation and Entrepreneurship**

Continuation of NSUR 278A for students wishing to work on actual strategy and implementation of their idea developed in 278A or, more generally, for students who wish to develop a strategic plan for a specific healthcare (drug or device) venture.

2-4 units, Aut, Win, Spr (Kallmeyer, V; Steinberg, G), Sum (Kallmeyer, V)

### **NSUR 279. Concepts in Drug Delivery and Drug Device Combinations**

Open to all graduate students. Issues relating to drug-device combination products, including review of recently approved products such as cardiac stent, and development, regulatory, and reimbursement issues. Emphasis is on market evaluation, product development, and regulatory strategies. Lecture only for 2 units; project for 4 units.

2-4 units, Win (Kallmeyer, V), alternate years, not given next year

### **NSUR 299. Directed Reading in Neurosurgery**

Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

## ORTHOPEDIC SURGERY (ORTHO) COURSES

---

### UNDERGRADUATE COURSES IN ORTHOPEDIC SURGERY

#### **ORTHO 97Q. Sport, Exercise, and Health: Exploring Sports Medicine**

(S,Sem Same as HUMBIO 97Q.) Stanford Introductory Seminar. Preference to sophomores. Sports medicine is the practice of clinical medicine at the interface between health and performance, competition and well-being. While sports medicine had its origins in providing care to athletes, medical advances developed in care of athletes exerted a great effect on the nature and quality of care to the broader community. Topics include sports injuries, medical conditions associated with sport and exercise, ethics, coaching, women's issues, fitness and health, and sports science. Case studies.

3 units, Aut (Matheson, G), Spr (Matheson, G)

#### **ORTHO 199. Undergraduate Research**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

## GRADUATE COURSES IN ORTHOPEDIC SURGERY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

### **ORTHO 222. Anatomy of Movement**

Perspectives include orthopedic surgery, neurology, mechanical engineering, computer science, anthropology, and art. Anatomy and pathology affecting the human locomotor system. Normal function and functional deficit from disease or injury. Engineering dilemmas that assist or emulate human movement, such as design of an artificial joint or simulation of tendon transfers for nerve palsy. The expression of human movement in art masterpieces and photography. The evolution of the hand as it became an instrument of purpose. Student team projects. Lecture only for 2 units; project for 4 units.

2-4 units, Win (Ladd, A; Rose, J)

### **ORTHO 260. Tissue Engineering**

Biological principles underlying the use of engineering strategies and biocompatible materials for tissue repair and regeneration. Structure, physiology, and mechanics of articular cartilage, bone, and dense soft connective tissues. Current ideas, approaches, and applications being implemented as therapeutic regimens for arthritis, spinal deformities, and limb salvage. Multidisciplinary constraints on the design and creation of tissue constructs. Prerequisite: familiarity with basic cell and molecular mechanisms underlying tissue differentiation.

3 units, Win (Smith, R)

## PEDIATRICS (PEDI) COURSES

---

Only Stanford Introductory Seminars open to undergraduates are listed. See <http://medcatalog.stanford.edu/> for additional offerings.

### UNDERGRADUATE COURSES IN PEDIATRICS

#### **PEDI 111Q. Issues of Race and Ethnicity in the Health of Children**

Stanford Introductory Seminar. Preference to sophomores. Medicine and pediatrics from a public-health, evidence-based perspective. How research methods unmask health issues for at-risk racial and ethnic groups of children. Determinants of health with regard to race and ethnicity and ideas for changes in public policy. Students identify an area of interest and proposed intervention.

3-4 units, Aut (Burgos, A)

## PSYCHIATRY (PSYC) COURSES

---

The following courses are available to undergraduates. For graduate and Medical School offerings, see <http://medcatalog.stanford.edu>.

### UNDERGRADUATE COURSES IN PSYCHIATRY

#### **PSYC 76Q. Temperament and Creativity in Mood Disorders**

Stanford Introductory Seminar. Preference to sophomores. Western cultural notions of mad geniuses and artistic temperaments. How many individuals who suffer from depression, bipolar disorder, and related problems are nonetheless productively creative. Current psychological and neurobiological research, and assessment of mood, temperament, and creativity. Emphasis is on written and oral communications and multimedia presentations. Write 2. Prerequisite: PWR 1.

4 units, Win (Ketter, T)

**PSYC 78Q. Mental Health in Collegiate Athletes**

Stanford Introductory Seminar. Developmental, social, and performance issues in collegiate sports. Topics include transition to Stanford, time management, coping with injuries.

*3 units, Win (Steiner, H; McCurdy, M)*

**PSYC 81Q. Fate of Orphans and Vulnerable Children in Sub Saharan Africa: The HIV/AIDS Pandemic**

Stanford Introductory Seminar. The complicated forces, shaped by geopolitical history and current events, that frame all social programs, the care of orphans in the context of the AIDS pandemic in particular; history of the care of orphans; developmental effects of deprivation of care and nurturing. Guest speakers.

*3 units, Win (Solvason, H; Reicherter, D)*

**PSYC 111Q. Madness and the Womb: Medical and Artistic Approaches to Mental Illness in Women Through the Ages**

Stanford Introductory Seminar. Historical and current concepts of mental illness in women. Premenstrual dysphoric disorder (PMS), postpartum depression, menopausal mood disorders, and eating disorders. Historical biopsychosocial approach. Readings include women's diaries and advice books, physicians' casebooks, and 19th- and 20th-century medical texts. Guest speakers from art and literature departments. Literary and artistic images, and the social and cultural contexts of these disorders during the last 300 years.

*3 units, Aut (Williams, K)*

**PSYC 135. Sleep and Dreams**

(Same as PSYC 235.) Current research on how sleep affects our daily lives. Physiology of non-REM and REM sleep, dreams and dreaming, content, psychophysiological cause, lucid dreaming, sleep need, sleep debt, daytime alertness, and performance; biological clock and circadian rhythms; sleep disorders, insomnia, narcolepsy, sleep apnea, sleepwalking, jet lag, sleeping pills, sleep and mental illness, sleep and memory, and the impact of sleep deprivation and sleep disorders on academic and social life. Multimedia presentations, guest lectures, and projects. GER:DB-NatSci

*3 units, Win (Dement, W; Van Rheenen, J)*

**PSYC 136A. Valuescience: Shedding Illusion to Live Better**

(Same as PSYC 236A.) Applying scientific methods and principles to discern and realize value. Readings in history, philosophy, ecology, economics, sociology, linguistics and psychology pertinent to scientific and cultural revolutions attending the emergence of valuescience as foundation for an increasing range of human action. Perceptual, cognitive, and cultural impediments to valuescience; strategies for overcoming these; personal and social benefits of doing so.

*3 units, Aut (Dement, W)*

**PSYC 136B. Valuescience: Shedding Illusion to Live Better**

(Same as PSYC 236B.) Continuation of 136A/236A. Applying scientific methods and principles to discern and realize value. Readings in history, philosophy, ecology, economics, sociology, linguistics and psychology pertinent to scientific and cultural revolutions attending the emergence of valuescience as foundation for an increasing range of human action. Perceptual, cognitive, and cultural impediments to valuescience; strategies for overcoming these; personal and social benefits of doing so.

*3 units, Spr (Dement, W)*

**PSYC 139. Clinical Introduction to Couples and Family Therapy (VAPAHCS)**

(Same as PSYC 239.) Introduces family-systems theory as a foundation for the practice of couples and family therapy in psychiatric and medical settings. Students observe couples and families in treatment "live" from behind a one-way mirror or on videotape and participate in post-session discussions. In these discussions with Family Therapy Program staff, students learn basic family interviewing, assessment, and intervention skills. Selected readings provide both a theoretical and practical introduction to couples and family therapy.

*1 unit, Spr (Rait, D)*

**PSYC 195. Special Laboratory Projects**

Assist Behavioral Neuroendocrinology Program with data entry, library organization, and study-related projects.

*1-3 units, Aut (Rasgon, N), Win (Rasgon, N), Spr (Rasgon, N),  
Sum (Rasgon, N)*

**PSYC 199. Undergraduate Research**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

*1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)*