Proposal for a Graduate Program in Epidemiology

Leading to the Degree of

Doctor of Philosophy

in

Epidemiology & Translational Science

at the

University of California San Francisco

Submitted by:

Robert A. Hiatt, MD, PhD
(rhiatt@cc.ucsf.edu /415 514 8113)

Neil Risch, PhD
(RischN@humgen.ucsf.edu /415 476 1129)

Professors and Co-Chairs
Department of Epidemiology & Biostatistics

January 12, 2009
Table of Contents

Proposal for a Graduate Program in Epidemiology and Translational Science

Section I: Introduction
   A. Aims and Objectives
   B. Historical Background
   C. Timetable for Development of the Program
   D. Relation of the Proposed Program to Similar Programs on Campus
   E. Interrelationship of the Program with Other University of California Institutions
   F. Department or Group that will Administer the Program
   G. Plan for Evaluation of the Program

Section II: Program
   A. Undergraduate preparation and Admission Requirements
   B. Application, Selection, and Admission Procedures
   C. Foreign Language
   D. Program of Study
   E. Field Examination
   F. Qualifying Examination
   G. Dissertation
   H. Final Examination
   I. Explanation of Special Requirements
   J. Relationship of Master’s and Doctoral Programs
   K. Special Preparation for Careers in Teaching
   L. Sample Program
   M. Normative Time from Matriculation to Degree

Section III: Projected Need
   A. Student Demand
   B. Opportunities for Placement of Graduates
   C. Importance to the Discipline
   D. Way in which the Program will Meet Needs of Society
   E. Relationship of the Program to Research and/or Professional Interests of the Faculty
   F. Program Differentiation

Section IV: Faculty
Section V: Courses (Core, Electives, Outside Electives)
Section VI: Resource Requirements
Section VII: Graduate Student Support
Section VIII: Changes in Senate Regulations
Section IX: CPEC Form

APPENDICES: 1. First year of TICR Master’s program curriculum
   2. List of potential new courses and descriptions
   3. Faculty biosketches
   4. Letters of support

3/6/09
Proposal for the Establishment of a PhD Program in Epidemiology and Translational Science at UCSF

Section I: Introduction

A. Aims and Objectives.

The UCSF Department of Epidemiology & Biostatistics (DEB) is one of the largest departments of epidemiology in the University of California system in terms of full-time primary faculty and the number of affiliated faculty. The proposed UCSF PhD Program in Epidemiology & Translational Science is a logical and much needed step in the academic development of this department and the contribution of the discipline of epidemiology to advancing the goals of this major health sciences campus. The proposed program is unique in the breadth and depth of its offerings and in the number of opportunities for future training and scientific development that do not currently exist on this campus or other University of California campuses. The partnership of the DEB with the new UCSF Clinical and Translational Science Institute (CTSI) in developing this program is another aspect unique to this proposal.

Specific aims and objectives of the program are to strengthen and expand the epidemiologic training available to students at UCSF and to develop academic areas of focus that draw on the strengths of our faculty and the campus. UCSF currently supports a highly successful clinical research training program, Training in Clinical Research (TICR), that provides excellent master’s level instruction in clinical epidemiology and other topics to large numbers of trainees in the four UCSF professional schools and Graduate Division. The UCSF CTSI will be a natural partner in the expansion of training in this area. The proposed PhD program will add to the current clinical research training with more advanced preparation across a broader range of applications for the discipline of epidemiology and biostatistics. Likewise, the DEB successfully supports training and research in etiologic studies in a number of disease areas. The proposed graduate program will also enhance this traditional domain of epidemiology.

A central goal is to take advantage of the highly interdisciplinary nature of UCSF and to take a transdisciplinary approach to graduate education. Epidemiology will serve as a key discipline (“an Epicenter”) in team science and in problem-based learning at UCSF. Indeed, the exciting concept of ‘transdisciplinary’ science, which requires tackling common problems across multiple disciplines with a common conceptual model, can hardly be conceptualized at UCSF without the contributions of the DEB. The proposed graduate program will have specialized training opportunities in a number of areas in which UCSF has academic strengths.

First, is in the area of genetic and molecular epidemiology. Fundamental research in basic science is rapidly contributing to a greater understanding of the role that genetics and molecular biology play in a wide variety of diseases as host risk factors. However, as translational research attempts to move this new knowledge into practice, it is evident that epidemiology and biostatistics are core disciplines required
to examine and understand genetic effects including gene-environment and gene-
genetic interactions, which are relevant to both clinical and public health practice.

Second, the DEB at UCSF is playing a substantial role in the implementation of CTSI
programs. The goal of the CTSI is to transform the nature of health science research
and training to make it more interdisciplinary and amenable to rapid and effective
translation into practical applications. Two linked concepts have been recognized: T1,
having to do with "bench to bedside" research, and T2, focused on application of
clinical findings to communities and populations. For both activities, but especially
the latter, epidemiology is a foundation discipline and epidemiologic and biostatistical
research and training will be critical in this interdisciplinary environment. These new
activities will require research and training that draws not only on the clinical
epidemiologic (e.g., clinical trials) expertise of the department and the CTSI, but also
expanded expertise in surveillance, community and population health, and
operations and implementation research. In partnership with the CTSI, translational
science will be a major theme in the new PhD Program.

A third area ripe for training is the area of pharmacoepidemiology. The UCSF School
of Pharmacy, and its Department of Biopharmaceutical Sciences, already has a
prominent Pharmaceutical Sciences and Pharmacogenetics (PSPG) training program,
with a strong emphasis on pharmacogenetics. Pharmacogenetics seeks to identify
genetic factors that influence treatment responsiveness and adverse drug reactions.
Important environmental factors also contribute to such outcomes, and putting
together the inherited (genetic) and acquired (environmental) factors that determine
an individual's response to treatment is squarely within the purview of epidemiology
and translational science. Pharmacoepidemiology also evaluates the efficacy and
effectiveness of drug regimes, studies the individual and population-based risks of
adverse outcomes associated with therapeutic exposures, methods of assessing
outcomes in clinical trials and post-marketing surveillance.

Fourth, epidemiologic and biostatistical methods play an increasingly important role
in health services research and training. This is an expanding field stimulated both by
radical changes in the delivery of health care and increased attention to the impact
of medical discoveries on health care systems. Decision analysis, cost-effectiveness
analysis, outcomes research and studies of the effectiveness and quality of care are
a few of the skills necessary in this field. The Institute for Health Policy Studies at
UCSF is a key partner for the application of epidemiology in this field and
interdisciplinary links to this and other relevant campus centers will be a part of
scope of the proposed PhD program. As already mentioned, a developing new area of
focus in the existing TICR program, supported by the CTSI and the DEB, is the area
of dissemination and implementation of research results (T2 research), which is
closely linked to this area of health services and outcomes research.

Fifth, epidemiology is the discipline that helps us understand the social and
behavioral determinants of health. As biomedical knowledge advances at the genetic
and molecular level, we are also gaining deeper understanding of the context of
human disease and the contribution of families, neighborhoods, workplaces, physical
environment, culture and social policies that are the 'upstream' determinants of
health and disease. Trainees need the background to understand and study these
contextual factors in a transdisciplinary approach to problem solving that, among
other things, also provides the tools for effective dissemination research.
Finally, in terms of aims and objectives, the proposed PhD in Epidemiology and Translational Science will enhance interactions with the broader academic and practice environment outside UCSF. The School of Public Health at UC Berkeley offers well-established courses and training in epidemiology with a clear public health focus that can complement those offered at UCSF. The Veterans Administration, the Kaiser Permanente Division of Research (DOR), state and local public health departments, the Children’s Hospital of Oakland Research Institute, Stanford, and UC Davis are all key Northern California partners in advancing population sciences and offering training and job opportunities for UCSF graduates. The research and training environment of the Bay Area are greatly enhanced by several unique well-defined population research resources at Kaiser Permanente and the VA. It will be important to build a closer and stronger association with Kaiser’s DOR based in Oakland. The DOR has independent and highly productive scientists of excellent caliber, who have actively collaborated with UCSF investigators over the years. Some of these researchers already have affiliate appointments in the UCSF DEB and participate in existing teaching and mentoring programs. Building on these existing relationships, collaboration with the DOR provides additional unique opportunities for both research and training at the PhD level. Indeed, with the development of the Research Program on Genes, Environment and Health at the DOR, there are now matchless opportunities for collaboration, which will accrue to the benefit of both institutions.

B. Historical Background

At UCSF, epidemiology is part of a combined Department of Epidemiology and Biostatistics that is based in the School of Medicine, although other professional schools at UCSF (i.e., Pharmacy, Nursing and Dentistry) count epidemiologists among their faculty. The department currently has 44 faculty members with primary appointments in Epidemiology and Biostatistics: 31 in epidemiology and 13 in biostatistics. Of these 25 are members of the Academic Senate. There are 12 emeritus professors. Although this is close to the largest concentration of faculty in epidemiology in the UC system (see Section E), the Department has only 5.5 state-funded faculty FTE’s, so faculty receive most of their salary from extramural grants or other sources. The Department is currently divided into five divisions (Biostatistics, Clinical Epidemiology, Preventive Medicine and Public Health, Multicenter Trials, and Cancer Epidemiology), and the faculty is physically located at one primary site at China Basin Landing in San Francisco with satellites at the Beale St. offices of the Global Health Sciences and at Parnassus, Mt. Zion, and Laurel Heights campuses.

The origins of the current DEB began in 1956 when preventive medicine achieved full departmental status in the School of Medicine at UCSF, with Salvatore Lucia MD serving as chair. Under Lucia’s influence, the philosophic perspective and teaching in preventive medicine emphasized human ecology, including diverse factors—biological, sociological, and geographical—that influence the physical and psychological well-being of humans. In 1966 the Department of Preventive Medicine was discontinued and responsibility for instruction in epidemiology was given to Ralph Audy MD, Director of the G.W. Hooper Foundation and internationally known for his work in the epidemiology of scrub typhus and other tropical diseases. In the next decade the core curriculum in preventive medicine in most American medical schools moved from an emphasis on infectious disease to the problems of an aging population, mortality and morbidity from chronic diseases, and social and health policy issues. In 1978 these factors elevated Epidemiology and International Health to the status of Department in the School of Medicine, with Nicholas Petrakis MD as
Chair. In 1983 the "Group in Biostatistics" became administratively affiliated with the Department of Epidemiology and International Health.

In 1989 Virginia Ernster PhD, was appointed Department Chair and under her leadership the name was changed to Epidemiology & Biostatistics to recognize the emerging role of biostatistics as the quantitative basis for epidemiology and clinical research. During the 1980s, Stephen Hulley MD MPH created the Clinical Epidemiology Program, which focused on diagnosis, prognosis, and therapeutic efficacy in patient populations, a departure from classical epidemiologic approaches to studying the distributions and determinants of disease in healthy populations. Clinical epidemiology, led by Thomas Newman MD MPH, became the basic science of evidence-based medicine and of clinical research. These programs and the addition of a clinical trial coordinating center, led by Hulley and Steven Cummings MD, resulted in marked growth of the Department and training in clinical research became a major activity.

In 1994, when Hulley was appointed Chair of the Department, new programs were created in molecular epidemiology, international health, methods for longitudinal analysis and clinical epidemiology. George Rutherford MD joined the faculty in 1997, bringing a Preventive Medicine Residency that emphasized training in public health practice, managed care administration and prevention research. In 1998 new Departmental Divisions (mentioned above) became the main administrative structures for overseeing teaching, research, and faculty affairs. In 1999 the new Institute for Global Health, directed by Richard Feachem, PhD, DSc (Med), was placed in the Department.

In 2000 Charles McCulloch, PhD became Head of the Division of Biostatistics. Two major Centers were founded in 2000-2001, one in Women's Health Research headed by Deborah Grady MD MPH, and one in Bioinformatics and Molecular Biostatistics headed by Mark Segal PhD. In 2002, the Department initiated a two-year Master of Advanced Studies in Clinical Research degree program, under the direction of Jeff Martin MD MPH that currently targets post-doctoral fellows at UCSF. The DEB expects to continue to offer this two-year masters program along with the proposed PhD Program. At present, there are 24 students enrolled in the Masters in Advanced Sciences (MAS) program, 12 in each year. In addition the DEB supports a one-year Certificate Program in Advanced Training in Clinical Research, which currently has 22 students.

In October 2006 Robert Hiatt, MD PhD and Neil Risch PhD were appointed as Co-Chairs of the Department. Hiatt is also Director of Population Science and Deputy Director of the Helen Diller Family Comprehensive Cancer Center. Risch is also Director of the Institute of Human Genetics. Under their leadership the DEB has since grown to 44 full-time primary appointment faculty members, 86 affiliated faculty, and 190 research and administrative staff. The formation of the NIH Roadmap CTSI, also in 2006, led to the DEB playing important roles in teaching, training and the facilitation of clinical and translational research in this new transformational program, although major DEB training grants (i.e., NIH K12, K30 awards) formally moved under the organizational structure of the CTSI.
DEB faculty members and programs remain integrally involved in the many translational activities of the CTSI, including providing advice on study design, biostatistical consultation, community engagement activities, program evaluation and administrative assistance, along with the training already mentioned above. A partnership with the training function of the CTSI provides a logical collaboration to form the proposed PhD Program and to advance the department’s training mission.

C. Timetable for Development of the Program.

We are aiming to matriculate our first students and begin classes in the fall of 2010. Prior to that time, we anticipate the need to seek review and approval of deans at UCSF, the Graduate Council, the Academic Senate, and the Chancellor. We will then require system-wide review from the Coordinating Committee on Graduate Affairs (CCGA) and the University of California Office of the President (UCOP). We currently have an extensive curriculum in place [see Section V] in epidemiology and biostatistics at the master’s level. Also numerous faculty members are currently supported by the DEB to teach at the undergraduate medical level. Seven new
faculty members have been recruited in the last two years and will take responsibility for new courses and advisory roles in the new PhD program and three to four additional faculty recruitments will be strategically chosen according to training needs in the PhD Program [See faculty in Section IV].

Approval Process and Draft Timeline for New Graduate PhD Program

1. Campus Review and Final Proposal:  
   Relevant Deans: Graduate Division/SOM  1 Month  Jan ‘09  
   Graduate Council  2 Months  Feb, March ‘09  
   Divisional Academic Senate  2 Months  Apr, May ‘09  
   Chancellor  1 Month  June ‘09

2. Systemwide Review  
   Coordinating Committee on Graduate Affairs  3-4 Months  Jun - Oct’09  
   UCOP Provost/Sr. VP, President approves  1 Month  Nov ‘09  
   New program announced and applications received  Winter Quarter ‘09-’10  
   Program Admissions  Winter/Spring Quarter ‘10  
   Program Begins  Fall Quarter ‘10

D. Relation of the Proposed Program to Similar Programs on Campus.

The proposed PhD in Epidemiology & Translational Science will entail a primary partnership between the UCSF DEB and CTSI and will also involve interactions with shared courses, joint research projects, and potential faculty mentors from several other programs on the UCSF campus.

- **Clinical and Translational Sciences Institute (Training in Clinical Research and Masters of Clinical Research):** Currently, instruction in the methods of clinical and translational research in preparation for the Masters of Advanced Studies degree is directed by CTSI and DEB faculty. The umbrella administrative structure of this basic and intermediate-level coursework is the TICR program, which is directed by a DEB faculty member (Dr. Jeff Martin). The CTSI is currently in the process of adding advanced graduate level training in the areas of “T1” (laboratory to human) and “T2” (evidence to practice) epidemiology and translational sciences. The proposed PhD program can provide relevant training in epidemiology and additional training in translational sciences beyond that provided by TICR both with DEB courses and training and through other affiliated programs listed below.

Among programs that grant academic masters and doctoral degrees are:

- **Bioengineering:** This joint PhD program with UC Berkeley has requirements for minor fields of study, including mathematics and/or statistics: for two semester or three quarter units of upper division or graduate level coursework. These students may also take epidemiology courses.

- **Biomedical Sciences (BMS):** This PhD program has eight tracks (Cancer Biology & Cell Signaling, Developmental & Stem Cell Biology, Human Genetics, Immunology, Neurobiology, Tissue/Organ Biology & Endocrinology, Vascular & Cardiac Biology, Virology & Microbial Pathogenesis) with supporting coursework emphasizing each. Epidemiology related to genetics,
virology, and microbial pathogenesis will be key areas of interaction in instruction, research and mentoring. The former genetics and genomics track within BMS is now focused on human genetics, and plans include enhancements in human population genetics and genetic epidemiology as well as other areas of laboratory based human genetics.

- **Biomedical informatics (BMI):** There are two pathways for this PhD program: Biological Informatics (BI), which focuses on graduate training in the study of biological composition, structure, function, and evolution at the molecular, cellular, and systems levels; and Clinical and Translational Informatics (CTI), which focuses on graduate training in informatics for clinical research and care. The latter program will provide coursework and interactions with epidemiology students who will utilize such skills in their research. The BI pathway now includes plans for a track in computational genetics, which will have courses relevant to students with an interest in genetic epidemiology.

- **Medical Anthropology (PhD), History of Health Sciences (PhD), Nursing (MS and PhD), Sociology (PhD):** All of these existing programs would benefit from epidemiology courses and potential joint research projects with the PhD students in epidemiology. The Medical Anthropology program in particular may be a useful source of instruction and mentoring for students interested in qualitative research to supplement their epidemiologic training.

- **PharmD/PhD in Pharmaceutical Sciences and Pharmacogenomics (PSPG):** This basic science oriented graduate program will also benefit, particularly from genetic epidemiology courses that would be part of the PhD program. Also this program will be our partner in developing the area of pharmacc-epidemiology.

- **Medical Science Training Program (MSTP):** There are approximately 12 MD/PhD students each year in this program, who typically take seven years to finish both degrees and usually focus on biomedical science. Basic scientists primarily mentor students. However, one slot is set aside for Anthropology. The Graduate Group in DEB and CTSI could join this program and support one or more medical students pursuing a PhD in Epidemiology and Translational Science as well. Tuition payments would have to be determined, if such an arrangement were to be pursued.

- **Global Health Sciences:** This umbrella unit is the academic home for a new MS in Global Health (and eventually a PhD program) that will rely in part on epidemiology content. Eleven of the 45 units in the Masters program are in epidemiology or biostatistics. More courses on population-based epidemiology with specific attention to global health problems in these may be added for the proposed Epidemiology and Translational Science PhD program. These could then support the PhD development in GHS as well.

Additionally several other programs should be noted as potential points for interaction:

- **Preventive Medicine Residency:** This joint program with UC Berkeley allows UCSF residents to spend one year on an MPH, usually in epidemiology at UC Berkeley, and then one year in a practicum at state or local public
health agencies. Epidemiology coursework can support their research at those agencies and strengthen their skills in preparation for careers in public health and epidemiology.

- **Pathways to Discovery Program**: This is a new program at UCSF as of the 2009 school year and will offer selected professional students a number of Pathways in which to concentrate their academic interest while in medical school and then in graduate training and as young faculty at UCSF. Several of the Pathways, which are now in their planning phase, are applicable to Epidemiology. They include Pathways in Clinical and Translational Science, Global Health, and Health and Society. Although this program is new, it is possible that some of the students in this program will want to pursue a PhD in Epidemiology and Translational Science.

- **The Helen Diller Family Comprehensive Cancer Center**: Ties between the UCSF Department of Epidemiology and Biostatistics (DEB) and the UCSF Helen Diller Family Comprehensive Cancer Center are especially strong with DEB representation in the senior leadership (Dr. Hiatt, the DEB Co-Chair). There is also a concentration of 11 cancer-related epidemiologists currently organized in the DEB Cancer Epidemiology Division. The planned joint recruitment of a mid-career molecular epidemiologist in a Cancer Center leadership role will be of mutual benefit and will advance UCSF’s capacity in this developing area.

- **Institute for Human Genetics**: The new UCSF Institute for Human Genetics (IHG) has a major focus on unraveling the genetic basis of common disease and drug response. Ties with the DEB are particularly strong due to Dr. Risch’s role as Director of the IHG as well as Co-Chair of DEB. There will be numerous opportunities for faculty development and training, in the areas of genetic epidemiology and statistical genetics. Several UCSF DEB faculty members are already core members of the IHG, in addition to its director and DEB co-chair, and continued expansion in this direction is expected. A feature related to genomics that will have a strong impact in this area is the development of the consolidated genomics core facilities at UCSF, which provides state-of-the-art genomics capabilities to a broad range of basic clinical, and population scientists, including those who would not otherwise have access to laboratory resources. As research in human genetics expands at UCSF, we anticipate enhanced need for specialized expertise in statistical genetics and genetic epidemiology to assist researchers in the design and analysis of the next generation of epidemiologic and clinical studies.

- **The Phillip Lee Institute for Health Policy Studies**: The UCSF Phillip Lee Institute for Health Policy Studies is in the early stages of planning for a PhD program, which could have synergies with graduate training in the epidemiology of health services and outcomes research.

**E. Interrelationship of the Program with Other University of California Institutions.**

Five other UC campuses offer or have approved plans to offer graduate degrees in epidemiology (see Table). Additionally Stanford (MS in epidemiology), the University of Southern California (MS and PhD in epidemiology and in molecular epidemiology)
and Loma Linda University (DrPH in epidemiology) offer graduate programs in epidemiology.

With the exception of Stanford, USC and UCI, these programs are located in schools of public health, where epidemiology is taught primarily as it relates to the practice of public health and public policy. The new UCSF program will teach classical epidemiology, including social and behavioral determinants of health, but will approach teaching from a perspective more focused on basic, clinical and translational sciences. Areas planned for the proposed UCSF PhD program include genetic epidemiology, clinical trials, pharmacoepidemiology, and health services (outcomes) research in addition to traditional epidemiologic training in understanding the etiology of human disease and topics relevant to the public health. Moreover, we will take advantage of partnerships, where relevant, including those with UCB, and with the Kaiser Permanente Northern California DOR.

Matriculated students are able to take upper division and graduate classes for credit on other UC campuses through the Intercampus Exchange Program in their area of study. Approval is on a course-by-course basis and requires signatures by the Graduate advisor, the Dean of Graduate Studies on the home campus, the Chair of the department in which the desired course is offered on the host campus and the Dean of the Graduate Division on the host campus.

**Table 1. Current graduate programs in epidemiology in the UC system.**

<table>
<thead>
<tr>
<th>School and degrees</th>
<th>Link to Courses</th>
<th>PhD students</th>
<th>Faculty</th>
<th>Areas of focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCB (MS, PhD)</td>
<td><a href="http://schedule.berkeley.edu/index.html">http://schedule.berkeley.edu/index.html</a></td>
<td>6 new, 65 continuing</td>
<td>31 epi, 8 biostat</td>
<td>Environmental, infectious disease, cancer and social epidemiology</td>
</tr>
<tr>
<td>UCD</td>
<td><a href="http://www.epi.ucdavis.edu/courses-frm.htm">http://www.epi.ucdavis.edu/courses-frm.htm</a></td>
<td>8-15 new, 38-40 continuing</td>
<td>14 Division of Epi</td>
<td>Environmental, occupational, veterinary, nutritional, health services, infectious disease and perinatal and reproductive epidemiology</td>
</tr>
<tr>
<td>UCI (MA, PhD)</td>
<td><a href="http://www.epi.ucla.edu/index.cfm/go/edu.edu/eduType/3/eduSubType/2">http://www.epi.ucla.edu/index.cfm/go/edu.edu/eduType/3/eduSubType/2</a></td>
<td>Program beginning in 2009, 6 continuing students in Social Ecology</td>
<td>18 epi and biostat</td>
<td>Cancer, environmental, genetic and reproductive epidemiology</td>
</tr>
<tr>
<td>UCLA (MS, PhD)</td>
<td><a href="http://www.ph.ucla.edu/epi/courses.html">http://www.ph.ucla.edu/epi/courses.html</a></td>
<td>10-20 new, 75 continuing</td>
<td>37 epi and biostat</td>
<td>Cancer, HIV, reproductive and diabetes epidemiology</td>
</tr>
<tr>
<td>UCSD (Jointly with San Diego State University Graduate School of Public Health) (PhD)</td>
<td><a href="http://www.epi.ucdavis.edu/index.cfm/go/edu.edu/eduType/3/eduSubType/2">http://www.epi.ucdavis.edu/index.cfm/go/edu.edu/eduType/3/eduSubType/2</a></td>
<td>7-8 new each yr, 27 enrolled</td>
<td>24</td>
<td>Infectious disease, chronic disease, cancer, behavioral,</td>
</tr>
</tbody>
</table>
Matriculated students are also able to take classes through the San Francisco Consortium, which include the University of San Francisco, Hastings College of the Law, San Francisco State University and Golden Gate University as well as UCSF. Per unit fees are charged at USF and Golden Gate, but there are no fees at the other institutions. The consortium arrangement applies only to regular sessions of the academic year and excludes summer session, intersession and extension courses. Cross-registration is limited to one course per term at one other institution. Matriculated graduate students are also able to take classes at Stanford University under a separate mechanism, which is similar to the San Francisco Consortium.

The several programs just outlined in the SF Bay Area provide the opportunity for additional course work in epidemiology, biostatistics, health services, medical informatics, computing, statistics and other areas. Additionally UCSF could serve as a collaborator, for Berkeley students in particular, who are interested in genetic epidemiology, pharmacoepidemiology and clinical trials, which will be areas of specialization at UCSF. Collaboration could extend to welcoming students from other campuses into courses, serving as mentors and developing joint research programs, examples of which already exist. For example, several DEB faculty members have sat on dissertation committees at UCB and Stanford and have taught extensively on those campuses.

**F. Department or Group that will Administer the Program**

The Epidemiology and Translational Science Graduate Group will be housed in the DEB and will be administered in collaboration with the leadership of the CTSI. The DEB is the sponsoring department that will provide the FTE's, research space, and administrative support to recruited faculty (for example, several new DEB faculty recruitments are planned in the near future to expand on the curriculum of the proposed PhD program).

The Epidemiology and Translational Science Graduate Group be a freestanding graduate program at inception. Over time it will become a multi-departmental, multi-school group. Affiliation with other UCSF graduate program consortia will be considered, as appropriate.

A Program Steering Committee (PSC) with a Program Director and a Program Administrator will govern the proposed PhD in Epidemiology and Translational Science. The DEB Co-Chairs and Executive Committee will have overall administrative responsibility for the Program.

- Program Steering Committee
  - Composition – In addition to the director, the PSC will be comprised of four members; a minimum of three of these members will be
Academic Faculty in DEB, one will be the Director of the CTSI or his/her designate, and one will be a member of the CTSI appointed by CTSI leadership. Members will be appointed by the department co-chairs, in consultation with the department executive committee and CTSI leadership.

- Duties and Responsibilities
  - Serve as the Admissions Committee
  - Serve as the Curriculum Committee
  - Set academic standards and establish requirements for enrollment in program
  - Make recommendation to Graduate Dean concerning dismissal of students who fail to fulfill requirements of program
  - Arrange for the periodic evaluation of the program.
  - Decide on graduate group membership of newly proposed faculty
  - Conduct a biennial review of program membership

- Procedures
  - Decisions of the PSC will be passed by a majority vote of the whole committee (3 of 5 members) or of those present when meeting in person
  - A calendar of events and meetings will be established at the beginning of each academic year

- Program Director – One of the Co-Chairs of the DEB will be the Program Director at the beginning of the program and will have the following duties and responsibilities:
  - Vote as a member of the PSC
  - Act as liaison between the Graduate Program in Epidemiology and Translational Science, the UCSF Graduate Division, UCSF Administration, outside epidemiologic associations, programs and students
  - Oversee funding and resources of program in consultation with DEB Department Manager and Co-Chairs
  - Recruit and supervise a Program Administrator
  - Act as liaison to the CTSI, attend their monthly meetings and provide information for the CTSI Annual Progress Report

- Program Administrator – The Program Administrator will be a half-time staff member in the DEB (e.g., 0.5 FTE for 20 students). This person will report to the Program Director and be responsible for program operations and have administrative duties related to:
  - Recruitment
  - Admissions
  - Student Financial Support
  - Budget (in consultation with Department Manager)
  - Coordination and staffing of relevant committees
  - Corespondence and communications
  - Tracking students
  - Website development and maintenance
  - Student materials (e.g., handbook)
  - Retreat preparation and implementation
  - Tracking course and instructor evaluations
Faculty Membership. At the inception of the new ETS Graduate Program, members of the graduate group will include all current primary DEB faculty who are members of the Academic Senate. Additional graduate group members will come from the ranks of the DEB affiliate faculty. The following affiliate faculty will be members at inception:

Deborah Grady
Clay Johnston
Edward Murphy
Kathryn Phillips
John Wiencke
Mary Whooley
Margaret Wrensch
Patricia Buffalo
Jack Colford
Steve Cummings
Arthur Reingold

Continuing membership in the program will be based on the following criteria:

- Member in good standing of the Academic Senate
- Participation in program activities, including teaching, mentoring students, accepting rotation students, serving on oral and dissertation committees
- Having an active research program, including:
  - Publishing regularly in peer-reviewed journals
  - Active grant support sufficient to maintain a research program for at least two years

Interested faculty members can petition the ETS Steering Committee for admission into the program. Typically, a new member will be proposed by a current ETS graduate group member, and supporting documentation (e.g. CV, current grant support) will be expected. Decisions on new members will be made by the ETS PSC.

G. Plan for Evaluation of the Program

The evaluation of the Graduate Program in Epidemiology and Translational Science will be included as part of the periodic review and evaluation of the DEB. The program will consider the development of SMART (Specific, Measurable, Attainable, Relevant, Time-bound) goals to assess its success on an on-going basis. The Ph.D. program will also be reviewed through the Graduate Division and Graduate Council Academic Review Process every six to seven years.

Section II: Program

A. Admission requirements and undergraduate preparation
Minimum criteria for admission to the PhD program are set by the UCSF Graduate Division and include a bachelor's degree and prior grade point average \( \geq 3.0 \) (on a scale with A=4.0, B=3.0, etc.) or its equivalent. A prior Masters degree in epidemiology, public health, clinical research, or a related field is required for admission to the PhD program. Exceptions may be made to accept students without a master's degree by the PSC. These students will be required to take the first year of TICR courses or their equivalent and continuing enrollment in the PhD Program will be contingent on successful completion of one year of the TICR Program.

Applicants must have taken the Graduate Record Examination (GRE) within five years of applying and will be part of the evaluation for admission, although there are no minimum GRE scores set by the Graduate Division. Physicians and medical students can substitute the MCAT examination, and other professionals (e.g., dentists) the equivalent examination, for the GRE. Applicants from countries judged by the Graduate Division not to have English as their primary language must also have taken the Test of English as a Foreign Language (TOEFL) and received a score \( \geq 570 \) (paper), \( \geq 230 \) (computer), or IBT (internet based test) with a score of 80. Applicants may also take the IELTS test with a minimum score of 7. Students who have completed degrees in countries where English is the native language are exempt from the testing requirement. In rare cases, exceptions to these requirements can be made by the Admissions Committee (i.e., the PSC). Only the Graduate Division can grant formal admission.

B. Application, Selection, and Admission Procedures

Applications will be downloadable from the UCSF-DEB website and submitted electronically. The deadline for receipt of the application will be in early December, for admission the following fall. An essay detailing the applicant's major interests and accomplishment to date as well as their reasons for applying to the UCSF PhD Program will be required. Other required documents (e.g. official, certified transcripts and letters of support) must arrive by the time admissions decisions are being made. Most admissions decisions will be made in mid-February.

The PSC will review all applicants for the PhD program as soon as they have been assembled and made available by the Program Administrator. Each applicant is assessed in terms of strength (based on GPA, GRE scores, letters of support, and prior research experience), broad area(s) of research interests as expressed in the application, and possible faculty mentors. This information is circulated to all relevant UCSF DEB faculty members who have expressed interest in mentoring doctoral students, to facilitate their review of a subset of applications prior to an admissions meeting in mid-February. All faculty members interested in offering admission to one or more applicants to the PhD program are welcome to attend the PSC meeting at which admission decisions are made. At that meeting, the qualifications of applicants are discussed, as are the available sources of funds to support and specific faculty to mentor each individual being considered for admission. If an applicant is selected by the PSC for consideration, a set of interviews will be scheduled to assess the applicants' interest and aptitude for transdisciplinary learning and research. A final decision on admission will be made by the PSC after interviews have been completed.

Many factors influence the number and quality of applicants to PhD programs in epidemiology (or other fields), so it is difficult to predict future trends in the number of applicants. However, with the creation of a UCSF PhD program, it is expected that
the number of students will start at 3-4 and slowly increase to a maximum of twenty students. The PSC will be charged with assuring that applicants proposed for admission are outstanding in their qualifications/preparation for doctoral study; representative of the diversity of California’s population; have a source of funding; have a faculty member interested in and willing to advise them; and have a high probability of success in terms of a career related to epidemiology and translational science.

C. Foreign Language

A Test of English as a Foreign Language (TOEFL) for those who do not speak English as a primary language will be required (see Section A. above).

D. Program of Study

PhD students will be required to spend six quarters in residence and generally to take 8-12 units per quarter for a total of 60 units prior to the written qualifying examination and advancing to candidacy, as required by the UCSF Graduate Division. We expect that applicants will want to take advantage of UCSF’s strengths in biomedical and clinical research as well as our transdisciplinary approach to training and research. Because of the diverse educational backgrounds of the applicants and those admitted, and because most masters degree programs in epidemiology (or related fields) do not routinely offer basic courses in the biological or social sciences or in mathematics, the students in the PhD program will vary substantially in their prior preparation in the social sciences (e.g. sociology, psychology, and anthropology), biological sciences (e.g. molecular biology, immunology, genetics, and microbiology), clinical sciences, and mathematics (e.g. calculus and linear algebra) relevant to the study of human health and disease. Given the diverse training backgrounds and “sub-fields” of epidemiologic research (e.g. social epidemiology, genetic epidemiology, infectious disease epidemiology, etc.) pursued by doctoral students, there is a need for doctoral students to have access to introductory or refresher courses in these areas. These can be acquired through existing master’s level training at UCSF or might be obtained through the Intercampus Exchange Program with UCB.

Required courses will be: 1) a yearlong advanced epidemiologic methods sequence, 2) a yearlong intermediate to advanced biostatistics sequence, 3) one topic specific epidemiology (“elective”) course and 4) a weekly Doctoral Seminar. The 2 hour weekly seminar will include works in progress and start in Year 2 of the Program when we project to have 4-8 students enrolled. In addition to the six quarters of residency (which enforces minimum amounts of coursework) a written/oral qualifying examination and the completion of an approved dissertation are required.

During their first year, students will each form a Graduate Committee of at least three faculty members comprised of one epidemiologist, one biostatistician, and one member from an external department whose expertise is related to the candidate’s research interest (this may be too early for a dissertation topic). A fourth member will be appointed for qualifying examinations by the PSC for quality control purposes. The chair of the committee will be a member of the DEB and would usually be the primary mentor. One faculty member should be from the chosen sub-field and presumed dissertation topic of the student (e.g., infectious disease epidemiology topic). The Graduate Committee will review the student’s plan of study, actively advise them on appropriate choices and make decisions as to acceptable progress.
Guidelines for typical and acceptable courses of study will be used, but exceptions would be liberally considered by the Graduate Committee depending on the needs of the student. The Graduate Committees will be overseen by the PSC to ensure consistency in the expectations for training and a level of achieved competence by all students.

The primary research mentor, who is the chair of the Graduate Committee and later the Dissertation Committee, will be the principal advisor and supporter of the graduate student. The primary mentor may provide financial support from existing research grants for tuition and or stipends. The mentor is also expected to offer the student an opportunity to conduct his/her dissertation work within the mentor’s research team, although the student may choose to work with a different dissertation advisor. The dissertation advisor and proposed dissertation topic requires approval of the Graduate Committee. The dissertation advisor cannot be part of the qualifying examination committee for their students.

In the first year of study, the student, with the assistance of his/her primary mentor and the Graduate Committee, will be expected to formulate a theme, concordant with the expected dissertation topic, that would guide topic-specific and experiential study. Common thematic areas in which the UCSF program is particularly strong include genetic epidemiology, infectious and chronic disease epidemiology, clinical/translational epidemiology, health outcomes epidemiology, and epidemiology for dissemination and implementation research; these areas or others could be chosen by the student, and customized as desired. Formulation of the theme will be the responsibility of the student with the oversight and advice of his/her Graduate Committee and primary mentor.

A student will be required to complete two quarters of “Research Team Rotations” (4 units each), similar to the Lab Rotation requirement in other established PhD Programs at UCSF (e.g., BMS, BMI and PSPG). The objective of these rotations is for the student to have the opportunity to:

1) Apply concepts taught in formal classes
2) Learn practical aspects of conducting research, including how to work within a multidisciplinary team
3) Acquire exposure to areas of research other than the student’s primary area
4) Launch projects with potential for developing into qualifying examination or dissertation research topic
5) Decide on a dissertation mentor, if not already identified (see Section G. below)

At least two Research Team Rotations will be required over three quarters before advancing to Candidacy status and they cannot be with the student’s primary mentor. Rotation requirements may be filled by prior experience or ongoing work at the discretion of the Graduate Committee. Research Team Rotations will not start until the yearlong sequences in epidemiology methods and biostatistics, as described above, have been completed (or waived by the Graduate Committee), and would usually occur during the second year of study.

Research Team Rotations will insert PhD students into active research teams at UCSF or affiliated institutions. Students will be apprenticed under a specific member of the research team (the Rotation Director), who would manage and take responsibility for the student’s experience. The goal for the Rotation Director would be to provide
author-level involvement (i.e., participation in research at a level justifying future inclusion as an author on a subsequent publication) for the student, and to help define this involvement such that, at the end of the rotation, the student will have produced a specific product. Examples of useful research products include, but are not limited to: 1) A research questionnaire or other data collection tool; 2) an operations manual chapter; 3) A set of research measurements from a wet lab or other setting; or 4) An annotated set of statistical analyses/tables/figures. The student should also produce a short proposal for an ancillary study or analytic project based on the research conducted by the Team. These proposals would ideally launch future research projects and collaborations for the student (see Research Team Objective 4, above).

Research Team Rotations will be categorized as focused on either analysis (Analytic Rotations) or generation of data (Non-Analytic Rotations). In Analytic Rotations the experience should include direct manipulation of data including drafting of statistical analysis code. In Non-Analytic Rotations, the focus will be on non-analytic aspects of conducting research including design, start-up, recruitment, measurement (in wet lab or other setting), data management, and/or regulatory and financial tasks. PhD students would be required to complete at least one Analytic and one Non-Analytic rotation. Neither of the required rotations may be with the primary mentor’s research team under the assumption that the student will work with the mentor’s team throughout much of the course of their training. A plan for which research teams to rotate with should be part of the Year 2 Plan of Study approved by the Graduate Committee. The subject matter for each rotation, however, is not prescribed by the PhD Program and would be determined by the needs of the team (represented by the Rotation Director) and the student.

E. Field examinations

None.

F. Qualifying examination

In the UCSF Epidemiology and Translational Science PhD program, doctoral students must take and pass a combined written and an oral qualifying examination. After completing the requisite first year coursework, which requires at least 3 quarters, a student may apply to the Graduate Division to take the qualifying examination with the written approval of the chair of his or her Graduate Committee. The examination is offered at the convenience of the student and his or her Graduate Committee and consists of a detailed ten-page National Institutes of Health (NIH)-style grant proposal to answer an epidemiologic research question of the student’s choosing, which is different from their dissertation topic. Students have 10 weeks to prepare and submit their proposal, which is reviewed by a qualifying examination committee. This committee requires a minimum of four faculty members, one of whom is designated by the Graduate Division as an “outside member.” The “outside member” must be a UCSF Academic Senate member who is not a core member of the DEB. Typically, the other three members of the oral qualifying examination committee are two epidemiologists and a biostatistician. Faculty from UCB (or other academic institutions) can, with written permission from the Graduate Division, serve on the oral qualifying examination committee, replacing one of the three “inside members” or augmenting the number of committee members. The faculty member designated
the chair of the oral qualifying examination committee must be a UCSF Academic Senate member who is a primary faculty member of the UCSF DEB. The chair a student’s qualifying examination cannot be the same person who chairs the students Graduate Committee.

The oral portion of the qualifying examination lasts for up to three hours, with the student being allowed to make a 10-15 minute presentation of the application at the outset. The questions for the oral examination will typically be based on the presentation, but can include materials covered from any required class in the curriculum, as well as anything pertaining to their area of specialization. The examination is intended to cover the breadth and depth of a student's knowledge in epidemiology, biostatistics, and, depending on the area(s) of expertise of the "outside" member, the student’s chosen “third” area. Because the submitted NIH proposal is in the student’s area of interest, questions will likely begin with the student’s dissertation research. However, any questions may be asked that are appropriate to assessing the qualifications of the student to advance to PhD candidacy. The committee can grade the examination either “Pass” (or “Contingent Pass”, pending response to committee concerns on the proposal) or "Fail". Students who are judged to have failed the examination are allowed to re-take the examination one time. The minimum time between examinations is three months. Ongoing financial support is contingent on successful academic progress. Students who fail the written exam a second time must leave the PhD program.

G. Dissertation

In a UCSF Graduate Program in Epidemiology & Translational Science, the goal is to have all doctoral students conduct original epidemiologic/translational research that will produce publishable results. Students are strongly encouraged to carry out primary data collection for at least one component of their dissertation research. All students are expected to have had experience in all of the key phases of epidemiologic research (e.g. conceptualization of the question; critical review of the existing literature; preparation of a grant proposal; collection, management, and analysis of epidemiologic data; and writing of one or more manuscripts for publication) and will have been tested on these essentials in their qualifying examinations. It is recognized that many of the students in the doctoral program, most of whom enter with substantial prior research experience, have actually performed one or more of these tasks before beginning the doctoral program. Furthermore, it is acknowledged that the Graduate Division of UCSF assigns to each student's Dissertation Committee the ultimate authority to determine what constitutes an acceptable dissertation and to certify that the student has successfully completed that task. As a result, some doctoral students may conduct analyses of previously collected data for one or more components of their dissertations.

Each doctoral student conducts research under the supervision of a thesis adviser (the primary research mentor) and a faculty Dissertation Committee formally appointed by the UCSF Graduate Division. It is expected that the Dissertation Committee will have essentially the same members as the student's Graduate Committee, but might vary if the student has changed directions since entering the program. The dissertation adviser, who acts as chair of the Dissertation Committee, must be a member of the DEB and a ladder rank or In-Residence faculty member at UCSF. The chair of the Dissertation Committee cannot have served as the chair of the student’s written or oral qualifying examination committee, but may have served on that committee. Dissertation Committees will generally include a biostatistician.
A Dissertation Committee must have a minimum of three UCSF faculty members, including the chair, and one of those numbers must be from "outside" the Graduate Group in Epidemiology and Translational Science. Faculty from UCB (or other universities) can be appointed to serve on Dissertation Committees at UCSF, but cannot chair such committees (unless they concurrently hold an adjunct appointment at UCSF and have been approved by the UCSF Graduate Division to chair dissertation committees) or serve as the outside member. All research involving human subjects, including analyses of previously collected data, must have been approved (or declared exempt) in writing by the UCSF Committee for Human Research in order to be included in a dissertation, regardless of which or how many other such committee elsewhere have previously approved the research.

Given the approval of their Dissertation Committee, doctoral candidates have the option of submitting for their dissertation requirement a single dissertation or three (or more) publishable first authored articles based on their doctoral student research. If one or more of these papers has already been published before the dissertation is filed, the Graduate Division requires that all co-authors of the paper give written permission for the paper to be submitted as part of the dissertation. Research completed and scientific papers written before the student has entered the doctoral program cannot be used as a part of the PhD dissertation under any circumstances.

H. Final examination

The UCSF PhD program in Epidemiology and Translational Science will not require a formal dissertation defense. However, doctoral students are expected to present some aspect of their dissertation research findings in a DEB monthly seminar. At earlier stages of their research, they are also expected to present their work at "work-in-progress" sessions of the weekly doctoral seminar.

I. Explanation of special requirements

None.

J. Relationship of master’s and doctoral programs

The UCSF Masters in Advanced Study in Clinical Research is a two-year course of study offered by the CTSI and the DEB. It is a self-supporting program wherein the fees for courses are covered by the student or their department and used to support faculty salaries and administrative costs. The PhD Program will build on the well-established record of the Masters Program. As detailed above under Admissions, admission to the PhD Program will require either that a student has already completed the first year of the UCSF Masters training or completed other masters training in epidemiology or, if a student is accepted as an exception without such training that they take the courses that are required for the Master's degree as a first step in their training (See Appendix A).

K. Special preparation for careers in teaching

In a UCSF PhD program in Epidemiology and Translational Science, all doctoral students are expected to teach, serving as a Teaching Assistant for a quarter-long course in either epidemiology or biostatistics at least once before they graduate. Teaching serves a dual role in the preparation of doctoral level epidemiologists/
translational scientists. First, it requires them to improve and organize their own knowledge in the field so that they can present and explain the material to others in an effective manner. Second, it gives them teaching experience that is invaluable if they go on to academic positions. Serving as a Teaching Assistant also helps provide students with financial support during the one or more quarters when they are teaching. UCSF courses for which doctoral students in epidemiology and translational science could serve as GSI's include the basic courses in epidemiologic methods and principles, as well as selected introductory courses in biostatistics.

**L. Sample program**

Below is an initial proposed curriculum. The table gives specific core courses by term, with electives listed as a footnote.

<table>
<thead>
<tr>
<th>Year</th>
<th>Term</th>
<th>Core Courses</th>
<th>Units</th>
<th>Total Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>Fall</td>
<td>Epidemiologic Methods II</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Biostatistical Methods IV (BIOSTAT 210)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Graduate Seminar I</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Winter</td>
<td></td>
<td>Epidemiologic Methods III</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Biostatistical Methods V (BIOSTAT 226)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Graduate Seminar II</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Spring</td>
<td></td>
<td>Biostatistical Methods VI (BIOSTAT xxx)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Epidemiologic Methods IV</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Graduate Seminar III</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Two</td>
<td>Fall</td>
<td>Research Rotation</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Individual Study</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Winter</td>
<td></td>
<td>Research Rotation</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Individual Study</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Spring</td>
<td></td>
<td>Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Individual Study</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Individual Study</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>

3/6/09
Three Dissertation

The electives to be offered by the UCSF PhD program will be in topic specific areas. Courses currently under consideration include (See Appendix B):

1. Cancer Epidemiology
2. Environmental/Occupational Epidemiology
3. Genetic Epidemiology
4. Advanced Clinical Trials
5. Musculoskeletal Epidemiology
6. Health Outcomes Epidemiology
7. Epidemiology for Global Health
8. Pharmacoepidemiology
9. Infectious Disease (HIV/AIDS) Epidemiology
10. Social Epidemiology

Many other courses are offered as part of other existing graduate programs at UCSF (see Section I. D.) and at other institutions and UC campuses through the Intercampus Exchange Program (see Section I. E.).

M. Normative time from matriculation to degree

The time needed to complete a PhD in Epidemiology and Translational Science will vary, depending on whether the student’s training and experience prior to enrolling in the PhD program and the time it takes to complete the dissertation research. Students who have completed Masters level training require an additional year or so to complete their coursework and pass their qualifying examination, followed by an additional two to three years to complete their research and file the dissertation. Thus, the mean time to completion of a PhD in Epidemiology and Translational Science at UCSF for students entering with a Masters degree or the equivalent is expected to be approximately 4 years.

Section III: Projected need

A. Student demand for the program

We propose an enrollment of four new students per year for five years until 20 UCSF students are enrolled. We expect no difficulty in admitting this number of top quality students at UCSF. The number of students admitted will depend on how many can be fully supported (tuition, fees and stipends) by UCSF faculty.

(there is currently no new student or faculty FTE expected. The program will need to show it has the resources without new FTE if the proposal is to move forward).

(I would add more detailed information in this section.)

B. Opportunities for placement of graduates

Doctoral-level epidemiologists/translational scientists are employed in academia, government and industry. In academia they can teach epidemiology and/or
biostatistics in schools of medicine or public health and increasingly at the undergraduate level (note that both the Berkeley campus and San Diego State University have undergraduate degrees in public health). Epidemiologists and epidemiologic training are central to new translational science programs in medical settings as exemplified by the NIH Roadmap initiatives and the CTSAs. In government they can be employed by public health agencies at the local, state, federal and international levels. In California, in particular, with 61 local health departments and multiple state-level agencies (of which the California Department of Public Health is but one), the need is particularly acute. Similarly, doctoral-level epidemiologists are employed extensively throughout the federal government in agencies such as the Centers for Disease Control and Prevention, the National Institutes of Health and the Environmental Protection Agency. Finally, doctoral-level epidemiologists are also widely employed throughout the United Nations systems, particularly in the World Health Organization, the World Bank, the United Nations Special Programme on HIV/AIDS (UNAIDS) and the High Commissioner for Refugees. They find employment not only in traditional public health agencies but also in more medically oriented functions, such as managed care organizations and health insurance agencies, the Department of Veterans Affairs and the military, in environmental agencies and in relief and development organizations, such as the United States Agency for International Development. In industry there are two basic paths. One is working on clinical trials design and pharmacoepidemiology in the pharmaceutical industry; the other is consulting on public health and medical issues for large consulting firms such as McKenzie, Management Sciences for Health and John Snow, Inc.

While there is no exact determination of the need for doctoral-level epidemiologists, there has been careful quantification of the need for preventive medicine physicians, an occupational group that is reasonably analogous in terms of duration and type of training and career paths. The Council on Graduate Medical Education has consistently found since the early 1980s that there was a substantial undersupply of physicians trained in public health. The American College of Preventive Medicine has pointed out in testimony to the Institute of Medicine that the demand for trained occupational and environmental physicians in private industry, education, and government agencies far exceeds the supply, and the need continues to grow. This shortage has been estimated to be approximately 3,000 practitioners.

C. Importance to the discipline

The UCSF Graduate Program in Epidemiology and Translational Science can lead the nation in a unique brand of epidemiology and biostatistics training by supporting a highly interdisciplinary program across applications in basic, clinical and population sciences. The UCSF PhD Program will not only have the highest standards for scholarly achievement and excellence in training, but will be integrated in critical ways with basic science, clinical departments, and population health in the four UCSF professional schools and Graduate Division, the School of Public Health at UC Berkeley, the Global Health Sciences program, the research arm of Kaiser Permanente, local health departments and other collaborators in Northern California. Such programs with a strong orientation to population health in a health sciences academic environment are uncommon, but with increased attention to translational science and the research to application pathway, this type of training will be critical.

D. Way in which the program will meet the needs of society
Epidemiology is a discipline that provides the tools to translate basic discovery in genetics and molecular biology into effective clinical interventions in diagnosis, therapeutics, and optimal health outcomes. These disciplines are also central to understanding population susceptibility and risk, individual and group health-related behaviors, complex health systems science, determinants of health and disease, and public health.

As high quality science in a complex world becomes more dependent on interdisciplinary research, epidemiology and biostatistics stand out as core disciplines critical to the success of any major health science undertaking. This is particularly true in an era of increasing focus on the power of translational and transdisciplinary science to generate new basic knowledge as well as clinical and public health applications. The partnership of this program with the UCSF CTSI ensures that this translational orientation will be instilled into the norms and expectations of the graduates of the program.

E. Relationship of the program to research and/or professional interests of the faculty

The formation of a graduate program in Epidemiology was selected as the top priority of the department by a vote of its senior leaders in 2005. The multiple research programs and interests of the faculty members would benefit greatly from the constant presence of graduate students within the department. This is contrast to the current education milieu that is characterized by visits to the department for classes one or two days a week by master's students or NIH Roadmap Scholars. Existing research programs in cancer, cardiovascular, infectious diseases, musculoskeletal and genetic epidemiology as well as a very active biostatistics and methodology group and strong interest from faculty members in the San Francisco Coordinating Center, which is co-located with the DEB and supports numerous large databases from national multi-center trials, all provide opportunities for graduate students to develop projects for their dissertations and other research and educational interests. Again, the establishment of a graduate program in epidemiology and translational science is seen as the most important development contributing to the scholarly growth and intellectual environment of the DEB.

F. Program differentiation

The proposed program in epidemiology and translational science has at least three characteristics that differentiate it from other existing or planned epidemiology training programs within the UC system or in the State of California. First, because it is based within a school of medicine, as compared to a school of public health, the orientation toward and opportunities for training and research in clinical problem solving and translational sciences as well as links to excellent basic science departments is very strong. UCSF is world famous for the outstanding quality of its basic sciences and opportunities abound (as detailed in Section I.D.) for Research Rotations and other training in basic science laboratories for interested students. Likewise, the campus' excellent professional schools, all rated within the top three in NIH funding nationwide, provide myriad opportunities to learn about the uses of epidemiology in the clinical setting. Furthermore, the focus of our program on epidemiology and translational science and the partnership between the DEB and the UCSF CTSI that this program represents, possible only within a health sciences campus environment, distinguishes it from any other program either within the University of California system or the State of California. However, UCSF is not just
a campus with excellent basic and clinical sciences. A second characteristic is that the campus is home to a very strong social science tradition and opportunities in behavioral and social epidemiology and community participatory research. Therefore, this multidisciplinary environment creates the setting for transdisciplinary approaches for epidemiologic training and research, which is a foundational value for the department as described above (Section I.A.). We want to create an “Epicenter” for translational and transdisciplinary research and education with this program. Finally, a third characteristic that, with the two just summarized, creates a unique environment is the sheer size of the department and thus the number of faculty available for teaching and research opportunities. With 44 full-time primary faculty and 84 affiliated faculty, all required to contribute to teaching for the department, PhD students will have numerous options to pursue their area of interest.

**Section IV: Faculty**

The 44 primary faculty members currently in the DEB are listed below. An additional 84 Affiliated Faculty, many of whom are active in the DEB teaching programs, can be referenced at [http://www.epibiostat.ucsf.edu/general/people/affilfac.html](http://www.epibiostat.ucsf.edu/general/people/affilfac.html).

Most of the faculty in the training programs of the CTSI are also core or affiliate members of the DEB.

<table>
<thead>
<tr>
<th><strong>Faculty Name</strong></th>
<th><strong>Title</strong></th>
<th><strong>Area of Expertise</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Peter Bacchetti, PhD</td>
<td>Professor</td>
<td>Survival analyses and statistical methods for HIV and liver disease</td>
</tr>
<tr>
<td>Dennis Black, PhD</td>
<td>Professor</td>
<td>Osteoporoses, clinical trials</td>
</tr>
<tr>
<td>Paige Bracci, PhD</td>
<td>Asst Adjunct Professor</td>
<td>Cancer Epidemiology</td>
</tr>
<tr>
<td>Dejana Braithwaite, PhD</td>
<td>Asst Adjunct Professor</td>
<td>Breast cancer etiology and prevention</td>
</tr>
<tr>
<td>Lisa Butler, PhD, MPH</td>
<td>Asst Adjunct Professor</td>
<td>Global health</td>
</tr>
<tr>
<td>June Chan, ScD</td>
<td>Associate Professor</td>
<td>Nutritional and hormonal risk factor for prostate cancer</td>
</tr>
<tr>
<td>Su-Chun Cheng, ScD</td>
<td>Associate Professor</td>
<td>Biostatistical methods</td>
</tr>
<tr>
<td>Richard Feacher, PhD, DSc (Med)</td>
<td>Professor</td>
<td>Health policy; health and economic development; international health</td>
</tr>
<tr>
<td>Lawrence Green, DrPH</td>
<td>Adjunct Professor</td>
<td>Public health education; psychometrics</td>
</tr>
<tr>
<td>David Glidden, PhD</td>
<td>Professor</td>
<td>Biostatistical methods; genetic and environmental factors in chronic disease</td>
</tr>
<tr>
<td>Margaret Handley, PhD</td>
<td>Assistant Adjunct Professor</td>
<td>Community-based and dissemination research</td>
</tr>
<tr>
<td>Name</td>
<td>Title</td>
<td>Research Areas</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------------------------------------------------</td>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>Robert A Hiatt, MD, PhD</td>
<td>Professor and Joint Chair</td>
<td>Cancer epidemiology</td>
</tr>
<tr>
<td>Joan F. Hilton, ScD, MPH</td>
<td>Professor</td>
<td>Inference based on exact permutation tests;</td>
</tr>
<tr>
<td>Elizabeth A. Holly, PhD, MPH</td>
<td>Professor-Recall</td>
<td>Epidemiology of non-Hodgkin lymphoma, pancreatic</td>
</tr>
<tr>
<td>Stephen B. Hulley, MD, MPH</td>
<td>Professor</td>
<td>Cardiovascular epidemiology</td>
</tr>
<tr>
<td>James G. Khan, MD, MPH</td>
<td>Professor</td>
<td>HIV disease and reproductive health; health care</td>
</tr>
<tr>
<td>Michael Kohn, MD</td>
<td>Assoc Clinical Professor</td>
<td>Application of clinical epidemiology to emergency</td>
</tr>
<tr>
<td>Marion Lee, PhD, MPH</td>
<td>Adjunct Professor - Recall</td>
<td>Nutrition; cancer; Asian-American health; alternative medicine</td>
</tr>
<tr>
<td>Christina Lindan, MD</td>
<td>Associate Adjunct Professor</td>
<td>International AIDS; STD epidemiology and prevention</td>
</tr>
<tr>
<td>Jeffrey N. Martin, MD, MPH</td>
<td>Associate Professor</td>
<td>Kaposi's sarcoma; HIV disease progression and</td>
</tr>
<tr>
<td>Sarah MacFarlane, PhD</td>
<td>Associate Adjunct Professor</td>
<td>International health</td>
</tr>
<tr>
<td>Charles E. McCulloch, PhD</td>
<td>Professor and Vice Chair</td>
<td>Longitudinal data analysis; latent class models</td>
</tr>
<tr>
<td>Dominic Montagu, DrPH, MBA, MPH</td>
<td>Asst Adjunct Professor</td>
<td>International health</td>
</tr>
<tr>
<td>John M. Neuhaus, PhD</td>
<td>Professor</td>
<td>Statistical methods for complex dependent data</td>
</tr>
<tr>
<td>Michael C. Nevitt, PhD</td>
<td>Professor</td>
<td>Osteoarthritis; osteoporosis; women's health</td>
</tr>
<tr>
<td>Thomas B. Newman, MD, MPH</td>
<td>Professor</td>
<td>Jaundice and infection in newborns, clinical</td>
</tr>
<tr>
<td>Dennis Osmond, PhD</td>
<td>Associate Adjunct Professor-recall</td>
<td>HIV/AIDS, Kaposi’s Sarcoma, epidemiologic methods</td>
</tr>
<tr>
<td>Kim Page-Shafer, PhD</td>
<td>Assoc Adjunct Professor</td>
<td>HIV prevention; international health</td>
</tr>
<tr>
<td>John W. Peabody, MD, DTM&amp;BH, PhD, FACP</td>
<td>Associate Professor</td>
<td>Health policy and health sector reform</td>
</tr>
<tr>
<td>Mark Pletcher, MD, MPH</td>
<td>Asst Adjunct Professor</td>
<td>Prevention of coronary heart disease; substance</td>
</tr>
<tr>
<td>Travis Porco, PhD, MPH</td>
<td>Associate Adjunct Professor</td>
<td>Mathematical modeling and forecasting of infectious</td>
</tr>
<tr>
<td>David Rehkopf, ScD, MPH</td>
<td>Asst Adjunct Professor</td>
<td>Social epidemiology, mathematical modeling</td>
</tr>
<tr>
<td>Neil Risch, PhD</td>
<td>Professor and Joint Chair</td>
<td>Human genetics, population genetics, statistical</td>
</tr>
</tbody>
</table>

3/6/09
Section V: Courses

Doctoral students in the UCSF PhD program in epidemiology and translational science will have had many of the courses in the existing TICR program upon entry, but will be able to take some additional courses in the TICR program as necessary and will have further in-depth training in epidemiologic methods and biostatistics, specialty courses (see Section II. L. above) as well as two required Research Team Rotations. We will introduce new courses in epidemiologic methods and new or expanded biostatistical courses. For the biostatistical courses, new areas to be offered will include survival and longitudinal data analysis (new courses or expanding EPI 209-210) and sampling. Other potential new courses include social epidemiology, pharmacoepidemiology, advanced topics in clinical trials design, environmental / occupational health, experimental and quasi-experimental design where the community is the unit of observation and global health sciences. Overall students are expected to develop expertise in epidemiologic theory and methods, biostatistics, and a "third area" (i.e., not epidemiology or biostatistics) designated by the student that is relevant to his or her research interests (e.g. demography, anthropology, oncology, behavioral science, virology, etc.). To accomplish this, doctoral students will take a series of advanced doctoral level courses during their first ~1.5 years in the PhD program, although there is substantial variation among students in the amount of prior coursework they have completed before entering the PhD program. Rather than require specific courses, the PhD program has identified areas of epidemiology and biostatistics in which doctoral students are expected to be competent and provides an array of courses that cover this material. A student, in consultation with his or her GC, decides which thematic area to follow and which
courses to take. Doctoral students will take courses offered in the School of Medicine and other UCSF professional schools as well as the UCB School of Public Health and in other departments at UCB in subjects outside of epidemiology and biostatistics as a means of developing expertise in a "third area" and establishing a relationship with one or more UC faculty who can potentially serve as the "outside member" on the student's written and oral qualifying examinations and Dissertation Committee.

Doctoral students are required to register for and participate in a weekly doctoral seminar (1 unit). Many advanced topics in epidemiologic methods, biostatistics, the interface between epidemiology and biostatistics, the conduct of transdisciplinary science and research methods will be discussed in the doctoral seminar, either in the context of a given student's research or based on important articles culled from the scientific literature. Doctoral students are expected to present their dissertation research plans, work in progress, and results in the doctoral seminar at appropriate time points, and guest faculty or subject matter experts are invited to join in various sessions, as appropriate.

Training in research ethics is essential for all doctoral students entering scientific fields, and particularly so for doctoral students in epidemiology and translational science, who almost invariably will be conducting research involving human subjects as doctoral students and in their subsequent professional careers. A research ethics course currently taught at UCSF by Professor Bernard Lo will provide for training in this area.

Section VI: Resource requirements

Start-up funds for the UCSF Graduate Program in Epidemiology and Translational Science have been set aside by the Dean of the School of Medicine. Additionally, funding will come from faculty research program grants and eventually from training program grants. The current resources available are outlined in the following table.

<table>
<thead>
<tr>
<th>Total number of students</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Number of students supported by program:</td>
<td>4</td>
<td>8</td>
<td>12</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>2. Number of students supported by individual projects or training grants:</td>
<td>0</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Personnel (Faculty &amp; Admin)</td>
<td>$104,248</td>
<td>$214,751</td>
<td>$331,791</td>
<td>$455,569</td>
<td>$469,329</td>
</tr>
<tr>
<td>Student Stipends*</td>
<td>$108,000</td>
<td>$111,240</td>
<td>$166,860</td>
<td>$216,000</td>
<td>$270,000</td>
</tr>
<tr>
<td>Tuition* (assumes 1 in 4 students out-of-state)</td>
<td>$80,500</td>
<td>$80,000</td>
<td>$115,000</td>
<td>$160,000</td>
<td>$195,000</td>
</tr>
<tr>
<td>Misc. ($1500/student/year)</td>
<td>$6,000</td>
<td>$12,360</td>
<td>$19,096</td>
<td>$26,325</td>
<td>$27,012</td>
</tr>
<tr>
<td>Totals:</td>
<td>$298,748</td>
<td>$416,351</td>
<td>$632,747</td>
<td>$857,885</td>
<td>$961,341</td>
</tr>
</tbody>
</table>

*only students directly supported by program

Total Costs Years 1-5: $3,169,072

Section VII: Graduate student support
Doctoral students require a reliable, continuous (for up to five years each) source of financial support to pay for their fees (and out-of-state tuition, when necessary), stipends, and research-related expenses. Currently, for comparison, a typical student in the UCB doctoral program requires approximately $30,000 to $35,000 a year in support if eligible for in-state fees and $45,000 to $50,000 a year in support if out-of-state tuition must be paid, excluding research-related expenses. As mentioned above, funding to support doctoral students at UCSF will come from 'start up' funds provided to the DEB by the School of Medicine that should be adequate for five years, training grants to be sought during the start up period, and a number of faculty research grants and contracts. Students will be eligible to compete for Graduate Division fellowships, and the program will also receive a small allocation from the Graduate Dean's block grant funds.

The policy will be not to admit any student to the UCSF Epidemiology and Translational Science PhD Program without an identifiable source of financial support for the first year in the program and a strong likelihood of ongoing support thereafter. Over the longer run (> 5 years) it is likely that most students will be funded from sources that are tied to a given campus or faculty member, with training grants being the most frequent exception.

Section VIII: Changes in Senate regulations

None anticipated.
Appendix A: UCSF Epidemiology and Translational Science PhD Program

Letters of Support

- Claire Brindis, Dr. P.H., Interim Director, UCSF Philip R. Lee Institute for Health Policy Studies
- Jason Cyster, Ph.D., Director, UCSF BMS Graduate Program
- Haile T. Debas, M.D., Executive Director, UCSF Global Health Sciences
- Kathleen Dracup, RN, FNP,DNSc, FAAN, Dean, UCSF School of Nursing
- Thomas E. Ferrin, Ph.D., Chair, UCSF Graduate Program in BMI
- Kathleen Giacomini, Ph.D., Chair, UCSF Dept of Biopharmaceutical Sciences
- John S. Greenspan, BDS, Ph.D., Director, UCSF AIDS Research Institute
- S. Claiborne Johnston, M.D., Ph.D., Director, UCSF Clinical and Translational Sciences Institute
- Talmadge E. King, Jr., M.D., Chair, UCSF Department of Medicine
- Mary Anne Koda-Kimble, PharmD. Dean, UCSF School of Pharmacy
- Arthur Reingold, M.D., Professor and Head, UC Berkeley Division of Epidemiology

Revised 4/3/2009
February 8, 2009

Jeff Lansman, Ph.D., Chair
Graduate Council
Box 0450,350 Parnassus Avenue S1272
University of California, San Francisco
San Francisco, CA 94143-0450

Dear Dr. Lansman and Members of the Graduate Council:

On behalf of the Philip R. Lee Institute for Health Policy Studies (PRL-IHPS), I am writing to express our enthusiastic support for the UCSF’s Department of Epidemiology and Biostatistics proposal for a PhD program in Epidemiology and Translational Science. Although we are an Organized Research Unit (ORU), the Institute has for many years supported an active training program for pre-doctoral and post-doctoral fellows in the areas of health policy and services research. Thus, we welcome the opportunity to work collaboratively with the Department of Epidemiology and Biostatistics as they launch their program that fills a critical training need on our campus and in the field in general.

Drs. Hiatt and Risch have developed a thoughtful proposal that describes a unique and far-sighted program. The proposed program will develop a new generation of translational researchers and leaders who will harness trans-disciplinary approaches to develop and apply evidence-based strategies to complex issues facing our health care system and society. The Program distinguishes itself from other epidemiology and biostatistics degree programs by building on the strengths of UCSF as a health sciences campus and its commitment to advancing health worldwide.

The Institute welcomes the opportunity to be involved in the development and implementation of the program as a key collaborator. PRL-IHPS faculty bring a wealth of expertise in the arena of “T2” and “T3” translational research. We are enthusiastic about the opportunity to work with students in the new program and to be involved in program didactics. Specifically, I would strongly support and encourage our faculty in their efforts to integrate Epidemiology and Translational Science PhD students as part of their research teams during students’ Research Team Rotations. Examples of Research Team opportunities at PRL-IHPS might include:

- Gaining a deeper understanding of how qualitative research methods can be used to inform and enhance translational epidemiological research by working with a team investigating the dynamics of clinical trials recruitment and enrollment among underserved cancer patients.
- Sharpening skills in the management and analysis of large administrative datasets by working on a team developing risk adjustment measures in conjunction with studies of hospital quality of care throughout California.
• Developing advanced health policy analytic skills by working with a team that is establishing the cost-effectiveness of male circumcision as an anti-HIV intervention and then grappling with the social and political challenges of implementing the intervention once its cost-effectiveness has been demonstrated.

As described in these brief examples, our collaborative opportunities would expose students in the proposed Ph.D. program to health policy issues, which in turn will enhance the capabilities and insights they will bring to their future leadership roles. I expect that these doctoral students will benefit from these training and mentoring opportunities at PRL-IHPS, but this is certainly not a one way street. Institute faculty and research staff will learn much from engaging with the high-caliber students the program is certain to attract. In addition, the Institute is in the process of planning and developing new degree programs in health policy, and the PhD in Epidemiology and Translational Science will provide opportunities for many mutually advantageous interactions as students in the various programs interact and learn from each other. Finally, the UCSF Pathways to Discovery program, which thus far has focused at the medical student and resident levels, has stimulated renewed interest in further developing the campus' population science education and training programs, and the proposed PhD will strengthen and bolster those efforts to the benefit of Departments, Institutes, and programs across UCSF, including PRL-IHPS.

Apart from educational opportunities, we anticipate that faculty from both the Department and the Institute will be collaborating in developing additional research projects that further link students from both epidemiology and health policy studies, for example, in designing intervention studies focused on health disparities. In summary, I applaud Drs. Hiatt and Risch on this innovative and exciting proposal and will collaborate with them in every way possible to make their vision a reality.

Sincerely,

Claire Brindis, Dr. P.H.
Interim Director, Philip R. Lee Institute for Health Policy Studies
Professor of Pediatrics and Health Policy
Department of Pediatrics and
Department of Obstetrics, Gynecology, and Reproductive Health Sciences

cc: Drs. Neil Risch and Robert Hiatt
January 27, 2009

Neil Risch, PhD and Robert Hiatt, MD, PhD
Co-Chairs, Department of Epidemiology and Biostatistics
185 Berry Street, Lobby 5, Suite 5700
Campus Box 0560
San Francisco, CA 94107

Dear Neil and Bob,

As director of the UCSF Biomedical Sciences (BMS) graduate program, I write to express my support of your plan to develop a new PhD program in Epidemiology at UCSF. The transdisciplinary plan you outline is both exciting and timely and takes excellent advantage of UCSF’s existing and developing strengths in epidemiology and biostatistics. Moreover, establishment of a PhD program in Epidemiology will infuse UCSF with new young talent that will further enhance research efforts in this area while bringing about new opportunities for interactions with wet bench and translation biomedical scientists. In the case of the BMS program, I can see many opportunities for synergistic interactions involving joint seminars and journal clubs (some such joint events in effect already occur but would be enhanced) and cross-participation of some students in each program’s courses. For example, I can see cases where PhD students in your program would benefit from access to existing BMS courses in human disease and reciprocally I anticipate future discussions about interested BMS students having the opportunity to take one of your programs’ courses in biostatistics or epidemiology. Thus, I fully support your new program and look forward to future collaborations between our graduate training efforts.

Best regards,

Jason Cyster
Director, BMS graduate program
Professor, Microbiology and Immunology
Investigator, Howard Hughes Medical Institute
January 28, 2009

Graduate Council
UCSF Academic Senate
500 Parnassus Avenue
Room MUE-230
San Francisco, CA 94143-0764

Dear Members of the Graduate Council:

I write to express my most enthusiastic support for the proposed PhD Program in Epidemiology and Translational Sciences. As a senior member of the UCSF faculty, and as the former Dean of the School of Medicine, I have always been concerned that UCSF does not grant PhDs in Epidemiology when it has such a strong Department of Epidemiology and Biostatistics.

The UCSF PhD in Epidemiology and Translational Sciences will not only be strong but also distinct from other similar programs, including that at UC Berkeley, because of the following:

1. The translational focus.
2. The two Departmental Co-Chairs bring exceptional expertise not only in epidemiology but also in cancer and genetics, which are important themes of an epidemiology PhD program.
3. Several programs on the UCSF campus will interact and benefit from the proposed program. These include: Global Health Sciences and its educational programs (MS in Global Health, Pathways to Discovery in Global Health, the "Sandwich" Certificate Training Program); the Institute of Health Policy Studies; as well as other programs.
4. The strong departmental programs that currently exist, especially the TICR Program.
5. UCSF Global Health Sciences plans to develop a PhD program in Global Health. We see mutually advantageous interactions in the PhD for Epidemiology and Translational Sciences and the PhD in Global Health. Indeed, the creation of the PhD in Epidemiology and Translational Sciences would make it easier for CHS to develop its PhD.

In summary, I support the creation of the PhD in Epidemiology and Translational Sciences enthusiastically. Over the years attempts have been made to develop a joint PhD degree with UC Berkeley. For a variety reasons this did not happen. In a significant way, I see the development of UCSF PhD in Epidemiology and Translational Sciences at this point in time a preferred option because the new focus
on genetics, translational sciences, and major disease processes (cancer, chronic diseases, etc.) creates a distinct program.

UCSF Global Health Sciences congratulates the Department of Epidemiology and Biostatistics and will collaborate in every way possible.

Yours sincerely,

[Signature]

Haile T. Debas, M.D.
Executive Director
Maurice Galante Distinguished Professor of Surgery
415.502.6045
hdebas@globalhealth.ucsf.edu

cc:    Robert A. Fiatt, M.D., Ph.D.
       Neil Risch, Ph.D.
February 13, 2009

Robert A. Hiatt, MD, PhD
Neil Risch, PhD
Co-Chairs Department of Epidemiology and Biostatistics
185 Berry St, Suite 5700
University of California San Francisco
San Francisco, CA 94705-0560

Drs. Hiatt and Risch,

I am writing to give you, your department and the leadership of the UCSF Clinical and Translational Science Institute my full support for your proposal for a new PhD in Epidemiology and Translational Science. As the Dean of the School of Nursing at UCSF, I am eager to support advanced training in epidemiology and translational science advanced by the Clinical and Translational Science Institute. Your program offers the kind of cross-disciplinary opportunities for advanced learning that will be valuable for nursing education.

I have reviewed your proposal and can see that it is based firmly on your successes with education of students from all four UCSF professional schools and the Graduate Division at the Master's level. There is clearly much strength in the department and its partnership with the CTSI. I agree with you that epidemiology is a key science at the heart of our campus-wide efforts to translate new discoveries into practice.

I appreciate the chance to learn about the program you are proposing and trust it will be successfully approved. We are happy to collaborate with these efforts in ways that will be mutually beneficial for your program and the School of Nursing. Again, you have my full support for this new PhD in Epidemiology and Translational Science.

Sincerely,

Kathleen Dracup, RN, FNP, DNSc, FAAN
Dean and Endowed Professor in Nursing Education
February 10, 2009

Neil Risch, PhD
Professor and Co-Chair
Robert Hiatt, MD, PhD
Professor and Co-Chair
Department of Epidemiology and Biostatistics
UCSF

Dear Neil and Bob,

I am very supportive of your proposal to establish a PhD Graduate Program in Epidemiology & Translational Science. As you know, the Biological and Medical Informatics (BMI) graduate program currently consists of two pathways, Bioinformatics, which focuses on PhD graduate training in the study of biological composition, structure, function, and evolution at the molecular, cellular, and systems levels; and Clinical and Translational Informatics (CTI), which focuses on graduate training in informatics for clinical research and care. There are several opportunities for interactions between both BMI pathways and the Graduate Program in Epidemiology & Translational Science.

First, there is the opportunity for students in each of our graduate programs to avail themselves of common coursework. For example, BMI offers two courses that will likely be of interest to the students in your program: BMI-206, Introduction to Bioinformatics and Computational Biology, and BMI-203, Biocomputing Algorithms. Similarly, a potential new course on human evolutionary and population genetics that Jeff Wall in your department is organizing would be of keen interest to our bioinformatics students. And the course on statistical genetics that Saunak Sen has in the works is also of interest.

I also note that there are already a number of formal and collaborative connections with BMI students and faculty in Epidemiology and Biostatistics. Several "epi" faculty are members of the BMI graduate program and have mentored BMI students, including Neil Risch, Mark Segal, Saunak Sen, Jeff Wall, and (until recently) Ru-Fang Yeh. Also, through collaborative research projects with Kathy Giacomini and Bruce Conklin, among others, BMI students have had additional interactions with epi/biostat faculty. I strongly believe that there will be similar opportunities for students in your new graduate program to interact with BMI faculty in exciting and cross-disciplinary ways.

In closing, I look forward to further interaction between BMI and your new graduate program. This represents a stimulating and advantageous training opportunity for our students, and attracting and training bright new scientists is, after all, key to the future of our world.

Sincerely,

[Signature]

Thomas E. Ferrin, Ph.D.
Professor of Pharmaceutical Chemistry and Biopharmaceutical Sciences
Chair, Graduate Program in Biological and Medical Informatics
January 28, 2009

Jeff Lansman, Ph.D., Chair
Graduate Council
Box 0450, 350 Parnassus Avenue S1272
University of California, San Francisco
San Francisco, CA 94143-0450

To Whom It May Concern,

It is with great enthusiasm that I write in support of the proposed Ph.D. program in Epidemiology and Translational Science. I believe that this program will attract a unique group of students focused on epidemiology and translational sciences that will undoubtedly contribute to the training environment here at UCSF.

This Ph.D. program, which will complement other Ph.D. programs here at UCSF, will provide excellent training in epidemiological projects focused on health. The hands-on experience that students will gain from developing their own research models will lead them to a breadth of information beyond the classroom setting. In addition, students will learn to become problem solvers as they broaden their own understanding for epidemiology. This highly interdisciplinary program will span basic, clinical and population sciences geared towards facing the demands of society.

Because it is housed in the School of Medicine, this program is distinct from similar programs at other institutions, which are housed in schools of public health. Placement in the School of Medicine and on a health science campus with Schools of Pharmacy, Nursing and Dentistry provides the trainees with close interactions with both basic and clinical scientists. A large number of faculty and affiliated faculty with diverse interests can contribute to the overall effectiveness of the program.

As the chair of the Department of Biopharmaceutical Sciences, my department houses two graduate groups: Biological and Medical Informatics and Pharmaceutical Sciences and Pharmacogenomics. Both of these Ph.D. programs have students with research projects that are relevant to epidemiology. Establishment of the proposed training program in Epidemiology and Translational Sciences will contribute to the training environment for both of our graduate
programs. In particular, the availability of didactic courses in epidemiology and interactions with both faculty and students in the proposed new training program will enhance the general training environment at UCSF. I am particularly enthusiastic about the proposed pharmacoepidemiology, which will complement and extend our training program in Pharmaceutical Sciences and Pharmacogenomics.

In conclusion, I enthusiastically and strongly support the proposed Epidemiology and Translational Science Ph.D. program. This program will certainly develop a high caliber of students that will be poised to succeed in all arenas of public health.

Sincerely,

Kathleen M. Giacomini
Professor and Chair
Department of Biopharmaceutical Sciences

cc: Neil Risch
Bob Hiatt
January 28, 2009

Robert Hiatt, MD, PhD
Box 0560
185 Berry Street, Lobby 4 5700
University of California, San Francisco
San Francisco, CA. 94143 - 0560

Neil Risch, Phd
Box 0794 , 513 Parnassus Ave,
Medical Sciences S-965
University of California, San Francisco
San Francisco, CA. 94143 - 0794

Dear Bob and Neil:

Thank you for sharing details of the proposed PhD in Epidemiology and Translational Science. My colleagues and I in the AIDS Research Institute at UCSF (the ARI) have reviewed this and are very supportive. So I am writing to give you, your department and the leadership of the UCSF Clinical and Translational Science Institute our enthusiastic support for the proposal for a new PhD in Epidemiology and Translational Science. We believe that the program planned offers the exciting cross-disciplinary opportunities for advanced learning that are consistent with our own educational mission. As we review the proposal we note that it is based firmly on your successes with education of students from all four UCSF professional schools and the Graduate Division at the Master’s level. There is clearly much strength in the department and its partnership with the CTSI that will allow further interdisciplinary science in AIDS/HIV, cancer studies, women’s and children’s health, chronic diseases and many other fields. I agree with you that epidemiology is a key science at the heart of our campus-wide effort to translate new discoveries into practice.

We appreciate the chance to learn about the program you are proposing and trust it will be successfully approved across the university system as you have laid out in your plans. We are happy to collaborate with these efforts by participating in didactic courses and offering many opportunities for research rotations and dissertation projects. Again, you have our full support for this new PhD in Epidemiology and Translational Science.

Sincerely,

John S. Greenspan
January 23, 2009

Robert A. Hiatt, MD, Ph
Neil Risch, PhD
Co-Chairs
Department of Epidemiology and Biostatistics

Dear Bob and Neal,

We are writing to provide the enthusiastic support of the UCSF Clinical and Translational Science Institute (CTSI) and the CTSI Training Program for the proposed PhD in Epidemiology and Translational Science. UCSF is one of 35 academic medical institutions in the US that have been awarded substantial NIH funding ($146M over 5 years) to support clinical and translational research. We are eager to use CTSI resources in support of the proposed PhD program. This unique graduate program will provide the exciting opportunity to train students in epidemiologic methods at a first-rate academic medical center where students can learn from and collaborate with a very broad spectrum of translational and clinical researchers from multiple medical disciplines. The proposed graduate degree is unique in providing students with clinically focused didactic training in research methods, as well as access to a huge array of medical research and clinical activities that will allow individualized experiential training.

CTSI will collaborate with the Department of Epidemiology and Biostatistics by including PhD students in the Masters in Clinical Research program, which is co-sponsored by the Department and CTSI. CTSI leaders will serve as members of the PhD Program Steering Committee and be available as appropriate to serve on Graduate Committees and as mentors for PhD candidates. In addition, CTSI can provide a wide range of other services to support the research activities of PhD students, including access to the CTSI Clinical Research Center (inpatient and outpatient space, skilled nursing and research coordinators); consultation services in research design, biostatistics, ethics, regulatory issues and community-based research; pilot funding; core laboratory support; bioinformatics, and access to clinical data for recruitment and research.

We look forward to beginning our collaboration as soon as possible.

Sincerely,

[Signatures]

S. Claiborne Johnston, MD, PhD
Deborah Grady, MD, MPH
January 31, 2009

Jeff Lansman, PhD, Chair
Graduate Council

Re: PhD program in Epidemiology and Translational Science

Dear Dr. Lansman:

I write to express my strong support for the establishment of a new PhD program in Epidemiology and Translational Science at UCSF.

UCSF is positioned to develop an outstanding and unique new PhD program that will be forward looking and attractive to the best students. Further, I believe the proposed PhD Program is a logical next step in the academic development of the Department of Epidemiology & Biostatistics and its growing partnership with the new UCSF Clinical and Translational Science Institute (CTSI).

A substantial number of faculty members in the Department of Medicine are interested in participating in this program and it draws on the strength of our faculty and the campus.

I commend the co-chairs of the Department of Epidemiology & Biostatistics (Robert Hiatt and Neil Risch) for their efforts in developing this proposal and pushing this effort forward.

Sincerely yours,

Talmadge E. King, Jr., M.D.
Julius R. Kevans Distinguished Professorship in Internal Medicine
Chair, Department of Medicine, UCSF
February 6, 2009

Neil Risch, PhD
Joint Chair, Department of Epidemiology and Biostatistics
Director, Institute for Human Genetics
UCSF Box 0794

Robert Hiatt, PhD
Joint Chair, Department of Epidemiology and Biostatistics
Director, Population Sciences
UCSF Box 0560

Dear Neil and Bob,

This is to express my very strong support for the proposed new PhD Program in Epidemiology and Translational Sciences at UCSF. As you so well articulate, epidemiology is the perfect “transdisciplinary” science that invites the solution of problems across disciplines. As we try to find ways to encourage true collaborative research, it is so important to nurture programs like these that are likely to attract students from a broad range of disciplines and backgrounds. By working together on important problems, students with diverse experiences will soon appreciate the unique perspectives and intellect their colleagues bring to issues. Surely, breakthrough thinking will occur.

Your proposed program is consonant with the vocal support of all deans for interdisciplinary training and with the School of Pharmacy’s strategic plan which states, “Our best work comes when we collaborate in unexpected ways where disciplines intersect.” A major goal of our plan is to mesh scientific and academic disciplines in new ways and to prepare more clinical scientists.

As you are aware, PhD programs are already based in multiple departments and schools and School of Pharmacy faculty members have taken the lead in many of these programs. This proposed program will most likely interact strongly with the Biological and Medical Informatics program and the Pharmaceutical Sciences and Pharmacogenomics program. Both of these graduate programs are sponsored by departments in both the School of Medicine and the School of Pharmacy.

Also, there is a potential link for the proposed program with our Department of Clinical Pharmacy and the Doctor of Pharmacy Program. A number of faculty members in this department engage in health services research (e.g. Kathryn Philips, Lisa Bero) and a few have joint PharmD/MPH degrees, with a focus
PhD Program in Epidemiology and Translational Sciences
February 6, 2009
Page 2

on pharmacoepidemiology. Several of Clinical Pharmacy faculty members have completed the Training In Clinical Research program and are embarking on T2 research. Many faculty members in this department, especially the chair, Joe Guglielmo, have been very active with the Clinical and Translational Science Institute.

Finally, the PharmD program in the School has offered a health policy and management pathway for seven or eight years. Several of these students have pursued MPH degrees at UC Berkeley or other institutions. The proposed PhD program in Epidemiology and Translational Sciences may be appealing to this group of students as a PharmD/PhD option.

I am confident that the School of Pharmacy community will become engaged with this program when it is approved. Thank you for working together to put forth such a thoughtful proposal for our campus.

Sincerely,

Mary Anne

Mary Anne Koda-Kimble, PharmD
Professor and Dean
T.J. Long Chair in Community Pharmacy Practice
January 28, 2009

Robert A. Hiatt, MD, PhD
Professor and Chair,
Department of Epidemiology and Biostatistics
University of California, San Francisco
Box 0560
San Francisco, California 94143-0560

Dear Dr. Hiatt:

Thank you for sharing the proposal for a Graduate Group in Epidemiology and a new PhD program at the University of California, San Francisco (UCSF). I have reviewed the proposal and commend you and your colleagues for a thoughtful, cogent, and pedagogically sound plan to initiate a PhD program at UCSF. As designed, it will provide excellent training that is not duplicative of the doctoral degree training we provide here at the University of California, Berkeley (UCB), especially given the very strong continuing (and likely future) demand for doctoral level epidemiologists and the recent “sun setting” of Stanford’s epidemiology PhD program. In fact, while it may be only a one-time phenomenon, the number of applications we have for our PhD program for fall, 2009 (> 80) is well above the mean number of applications we typically receive each year (~ 65). Of those > 80 applicants almost all meet our Graduate Division’s minimum requirements for admission, and I would rate 50 to 60% of the applicants as excellent or outstanding candidates for doctoral training in epidemiology. Nevertheless, we will offer admission to only ~15 to 16 of the candidates, of whom we expect 12 to 13 to matriculate here at Berkeley.

Once you are successful in establishing your program, it is my hope that we will not only continue our various research and training collaborations, but that they will expand. I can envision there being excellent opportunities to combine our efforts to expand training grant support for doctoral students, as well as enhanced educational opportunities for students from both campuses through cross-registration for courses; development of joint courses; and other innovative approaches.

Best of luck with this endeavor.

Sincerely,

Arthur L. Reingold, MD
Appendix B: UCSF Epidemiology and Translational Science PhD Program

Expanded Course Descriptions
March 11, 2009

Dear Drs. Calarco and Lansman,

Thank you very much for your letter of 5 March 2009 summarizing the Graduate Council's review of our proposal for the PhD in Epidemiology and Translational Science on 12 February 2009. We were pleased to see that the proposal had a favorable review and are eager to respond to the questions raised. We also appreciate the chance to meet with the Graduate Council at their next meeting on 12 March and will try to answer all questions at that time. In this letter we will respond to each item as best we can at this time.

1. Overlap with the Biomedical Informatics and Medical Informatics PhD Program.

The UCSF BMI program focuses on the study of biological and medical informatics. Bioinformatics relies on techniques from applied mathematics, informatics, statistics, computer science, physics, chemistry, and biology to study biological composition, structure, function, and evolution at the molecular, cellular, and systems levels. It comprises all aspects of the gathering, storing, analyzing, predicting, and disseminating the corresponding information. Students in the BMI program typically have strong backgrounds in mathematics, computer science and physics, and their research work is heavily mathematical and computational.

By contrast, the proposed PhD program in Epidemiology and Translational Science focuses on biological and social determinants of health and disease, and their distribution at the population level. While the two programs intersect in that both are in some sense quantitatively oriented, the focus of study is quite distinct. Students applying to the Epidemiology and Translational Science PhD program are likely to have broader interests in health and disease, with backgrounds in biology and social sciences, and while their research involves quantitative analysis, it is unlikely to be as intensive in this area as for a typical BMI student. The reason for including the BMI program in our proposal and appended a letter of support from its
director is that we do see some areas of overlapping interest in the area of computational genetics and genomics and genetic epidemiology, where there is a possibility of shared courses and cross trainings.

2. Support to and from the CTSI.

The CTSI has had plans to develop their own PhD in Clinical and Translation Science and found through discussion with us that our goals and the content proposed was very similar. By partnering on the submission of the current proposal the needs of the CTSI were satisfactorily met and a second PhD proposal was not necessary. The CTSI leadership was mainly concerned that the PhD be suitable for individuals (mainly clinicians) in the Training in Clinical Research program and in the KL2 Roadmap Scholars program, that the program build on and not weaken the Masters in Clinical Research and that there be representation of the CTSI in the PhD leadership group. These points were all addressed satisfactorily in negotiation as reflected by the letter of support from CTSI leadership.

Also, as stated in their letter of support, “CTSI leaders will serve as members of the PhD Program Steering Committee and be available as appropriate to serve on Graduate Committees and as mentors for PhD candidates. In addition, CTSI can provide a wide range of other services to support the research activities of PhD students, including access to the CTSI Clinical Research Center (inpatient and outpatient space, skilled nursing and research coordinators); consultation services in research design, biostatistics, ethics, regulatory issues and community-based research; pilot funding; core laboratory support; bioinformatics, and access to clinical data for recruitment and research.” No financial support could be offered at this time.

3. Staffing of new courses to be developed, number of students expected and sample course syllabi.

We append a fuller description of a number of the core and elective courses we are developing along with the faculty member responsible. We do not plan to offer all these courses in the same year and anticipate an every other year schedule. We think the courses will have 10-12 students including both PhD students and those from other graduate programs.

4. Flexibility of mandatory rotations and students payments when not aligned with a funded research group.

We agree that some flexibility will be needed in the required Research Team Rotations. In our proposal we tried to take this into account by stating “A portion of this requirement may be filled by prior experience or
ongoing work outside of the University at the discretion of the Graduate Committee” (p 16), by which we mean that the student’s

Graduate Committee can decide that the student has already had adequate epidemiologic related experience in appropriate research setting.

The program will cover the student stipend during the second year, if not covered by a training program grant or by the research program of their mentor.

We hope these responses serve to clarify questions raised by the Graduate Council. We look forward to elaborating on this information in any way the Council wishes on March 12th.

Sincerely,

Robert A. Hiatt and Neil Risch
Graduate Program in Epidemiology & Translational Science  
University of California, San Francisco

Course Title: Biostatistical Methods VI: Advanced Biostatistical Methods for Clinical and Translational Research
Quarter Units: 3
Offered: Spring quarter, every other year
Director: David Glidden, Ph.D.
Professor, Division of Biostatistics
185 Berry St, Ste 5700
San Francisco, CA 94107
Phone: (415) 514-8009 email: david@biostat.ucsf.edu
Office hours: By arrangement

Description:
This course covers advanced, modern statistical methods for clinical and translational research with an emphasis on computer intensive methods. Topics include nonparametric methods (generalized additive models, spline methods, classification and regression trees), methods to handle missing data (joint models, multiple imputation) and the use of simulation and permutation methods for statistical inference and model checking (bootstrapping, permutation tests, cross-validation). Many of the topics will be applied in conjunction with the methods taught in Biostat II and III. The statistics package R will be introduced and used throughout. The course is case-study based and will have a weekly 1.5 hour computer lab as well as 2 lecture hours.

Objectives:
Learn how to use the statistical package and programming language R. Use nonparametric methods to fit models that are more flexible than traditional regression models. Use nonparametric methods to demonstrate lack of fit of traditional models. Use bootstrapping and permutation tests to diagnose and correct mis-specified parametric models. Use cross-validation to unbiasedly assess prediction error. Use cross-validation as an aid in predictor selection and model building. Define different types of missing data. Describe different approaches to handling missing data (complete case analysis, imputation, selection models, joint models, pattern mixture models, inverse weighting methods) and their advantages and disadvantages. Given a problem, decide on the most appropriate methods for handling missing data. Use R to implement missing data procedures.

Content:
- Introduction to the course and to R.
- Nonparametric regression methods I (motivation, introduction and examples)
- Nonparametric regression methods II (splines, generalized additive models)
- Nonparametric regression methods III (classification and regression trees)
- Model diagnostics I (motivation, introduction and examples)
- Model diagnostics II (bootstrapping)
- Model diagnostics III (permutation tests).
- Missing data I (motivation, types of missing data, types of missing data models).
- Missing data II (selection models and pattern mixture models).
- Missing data III (multiple imputation and inverse weighting methods).

Material:

Required: An Introduction to R. W. N. Venables and D. M. Smith, 2002

Testing and Assessment:

Grades are based on homework assignments (7 assignments, 10% each of grade, a midterm examination - 10% of grade and a final project - 20% of grade).
Graduate Program in Epidemiology & Translational Science
University of California, San Francisco

Course Title: Cancer Epidemiology  
Quarter units: 3  
Offered: Fall quarter, every other year 
Director: Joseph Wiemels, Ph.D.  
Associate Professor, Division of Cancer Epidemiology  
Laboratory for Molecular Epidemiology  
1 Irving Street, AC-34  
San Francisco, CA 94143  
Phone: 514-0577, email: joe.wiemels@ucsf.edu  
Office hours: by arrangement

Description:  
This course will first cover the biology and pathogenesis of cancer, and then examine the impact of environmental and genetic risk factors on cancer in human populations. We will focus on the current understanding of the biology and epidemiology of common cancers, including known environmental and genetic causes, study designs for detecting other potential causes, and the implications of screening on the public's health. Substantive findings from epidemiologic studies of major cancers studies will be discussed. The ultimate goal of this course is developing an understanding of the field and learning the skills required for undertaking high-level cancer epidemiologic research.

Objectives:  
At the end of this course students will understand the principles of cancer epidemiology research methods, and the major risk factors and their possible mechanisms of action. Specifically, students will be able to:

- Describe the principals of the molecular and cellular basis of cancer development and natural history.  
- Describe the various epidemiologic study designs used for the study of cancer etiology and their strengths and weaknesses.  
- Describe major hypotheses regarding cancer causation via environmental and genetic factors.  
- Understand the role of viruses, diet, and immune function in cancer development.  
- Understand the role of biomarkers of environmental carcinogens, immune function, and early detection in cancer epidemiology studies.  
- Define national, international, age, race, and ethnic specific patterns in cancer incidence and mortality in populations.  
- Identify sources of cancer surveillance data and evaluate their use in research.  
- Describe the basic principles of cancer control, primary prevention, and screening.  
- Identify the established and suspected risk factors for cancers of the breast,
cervix, prostate, pancreas, liver, lung, colon, and hematopoietic system.

- Describe the increasing need for, and reliance on, consortia for epidemiologic advances.
- Identify a topic for epidemiologic research by formulating a research question and proposing a study design to address this question.

**Content:**

- Overview of Cancer Epidemiology and Cancer Biology: Introduction to the course followed by a discussion of major risk factors and cancer types. The burden of cancer on society. (Wiemels)
- Cancer biology and multistep carcinogenesis: The molecular basis of cancer including the genetic and epigenetic changes that cancer cells acquire. The molecular and cellular basis of known common cancer risk factors. (Wiemels)
- Study Designs and Data Acquisition: Types, examples, and utility of major study designs in cancer epidemiology. Types of data available in population registries. Exposure assessment, population sampling, and interview instruments. (Bracci)
- The immune system, infection, and cancer: Inflammation and cancer, viral cancer etiologies, biomarkers of infection and inflammation in cancer epidemiology studies. (Coussens and Moscicki)
- Breast cancer epidemiology and screening: Primary care and organization of health systems; maternal and child health, reproductive health, women’s health, nutrition) (Kerlikowski and Hiatt)
- Brain cancer epidemiology and outcomes: Risk factors and survival in a brain cancer study, illustrating different study designs, tumor heterogeneity and host factors (Wrensch)
- Nutrition, hormones and cancer: The role of nutrition, hormones, and serological factors in the epidemiology of prostate cancer. (Chan)
- Genetic epidemiology of cancer: Study designs and methodology of studying inherited genetic contribution to cancer, with specific examples (Witte)
- Lung cancer epidemiology: ethnic and social disparities: The impact of biologic, genetic, and social differences that contribute to cancer disparities. (Wiencke)
- Consortia and collaboration: Increasing dependence of national and international consortia to tackle epidemiologic issues. Examples from solid tumors and hematopoetic malignancies.
- Prevention and Clinical Trials: The goal and structure of population and clinical intervention for cancer prevention. Study designs around clinical trials.

**Testing and Assessment:**

- Class participation: 20% Attendance is mandatory to all classes.
- Final exam: 40%. The exam will concentrate on reading and lecture material.
• Student presentations and report: 40%. Students will identify a topic for epidemiologic research during the first two weeks of the course. This will be developed into a research project that will be presented to the class at the end of the course. A written report will be due following presentations. Students will identify an important research question by reading recent literature in a subject area of interest. The report will be written as a grant proposal, with sections entitled, Specific Aims, Background, Previous Studies, Research Methods, and Anticipated Pitfalls and Alternatives.
Graduate Program in Epidemiology & Translational Science
University of California, San Francisco

Course Title: Environmental and Occupational Epidemiology
Quarter Units: 3
Offered: Fall quarter, every other year
Director: Lydia Zablotska, M.D., Ph.D.
Assistant Professor, Division of Cancer Epidemiology
3333 California St, Ste 280
San Francisco, CA 94143
Phone: (415) 476-4673 email: lydia.zablotska@ucsf.edu
Office hours: By arrangement

Description:

This course will provide a broad review of environmental and occupational health issues, focusing on the in-depth examination of short- and long-term human health effects of environmental exposures. The course will also introduce students to other important issues and concepts in the field, including source and exposure assessment, biomarkers and qualitative risk analysis, and environmental health risk communication. Students will examine and critically evaluate original scientific publications and learn to synthesize diverse data on environmental health into concepts. A case study of the effects of occupational radiation exposure in U.S. nuclear power industry workers will be used to examine all aspects of the health consequences of exposure and public health policies. Building on information from assigned materials, experiences and insights obtained in class discussions, and preparation and oral presentation of written term paper, students will develop a focused assessment of issues in environmental and occupational epidemiology.

Objectives:

- Discuss the role of environmental and occupational epidemiology within the broader field of public health and medicine.
- Learn the current understanding of relationships between environmental and occupational exposures and health outcomes through the use of epidemiologic methods.
- Develop a clear understanding of the differences between the major types of analytical epidemiologic study designs as they relate to the study of environmental and occupational exposures.
- Develop skills of critical appraisal of scientific evidence relating to potential environmental hazards to health.
- Identify the main principles of health risk assessment and methods of communicating the findings to the key community, workplace, and governmental stakeholders both orally and in writing.

Content:

- Overview of history and scope of environmental epidemiology.
• Approaches to assessment of environmental exposures and their health effects: disease clusters, passive and active surveillance and epidemiological study designs.
• Measurement errors: consequences for validity and precision of epidemiological studies of environmental and occupational exposures.
• Applications of environmental epidemiology: air and water pollution.
• Topics in occupational epidemiology: occupational radiation exposures and health.
• Studies of gene-environment interactions.
• Risk assessment and communication.
• Ethics and environmental epidemiology.
• Student presentations.

Material:


Testing and Assessment:

Grades will be determined as follows:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take-home midterm exam</td>
<td>25</td>
</tr>
<tr>
<td>Final paper</td>
<td>40</td>
</tr>
<tr>
<td>Classroom presentation</td>
<td>25</td>
</tr>
<tr>
<td>Seminar participation</td>
<td>10</td>
</tr>
</tbody>
</table>

• Weekly assignments will consist of reading assigned materials from the textbook and selected journal articles and book chapters, as listed in the schedule.
• Term paper will provide an in-depth investigation of the relevant literature on a selected topic of environmental and occupational epidemiology. Students will follow a research protocol similar to a condensed version of an NIH grant application, specifying study aims, background and significance, research design, methods, and interpretation.
• Classroom presentation of written term paper with special emphasis on communication of health risks to key community, workplace and governmental stakeholders.
Graduate Program in Epidemiology & Translational Science
University of California, San Francisco

Course Title: Epidemiology II
Quarter Units: 3
Offered: Winter quarter, every other year
Director: Tom Newman, M.D.
Professor, Division of Clinical Epidemiology
185 Berry St., Ste 5700
San Francisco, CA 94143
Phone: (415) 514-8000   email: tnnewman@epi.ucsf.edu
Office hours: By arrangement

Description:

This course extends upon the curriculum taught in Epidemiology I (Epi 203) to include more advanced instruction in the philosophy of causal inference; the interrelationships between various measures of disease occurrence and association; competing risks; concepts of attributable risk, practical and theoretical considerations of the most common study designs in observational research; less commonly used study designs; and the use of causal diagrams to identify and manage selection bias and confounding.

Objectives:

The objective of the course is to enhance a student’s ability to design and conduct unbiased and efficient research and to be a sophisticated reviewer of others’ work. Instructional goals are achieved through weekly lectures, small group discussion sections, and literature-based problem sets. While there will be a brief review of topics covered in Epi 203, it will be assumed that the student has a solid foundation in that material.

Content:

- Causation and philosophy of causal inference
- Interrelationships between measures of disease occurrence and association and standardization of measures of association
- Accounting for competing risks
- Measures of attributable risk
- Ecologic study design
- Theoretical and practical considerations in cohort study design
- Theoretical and practical considerations in case-control studies
- Less commonly used observational study designs (case only, case-crossover; proportional mortality, etc)
- Applications of causal diagrams: Selection bias
- Applications of causal diagrams: Confounding
Graduate Program in Epidemiology & Translational Science
University of California, San Francisco

Course Title: Epidemiology III
Quarter Units: 3
Offered: Spring quarter, every other year
Director: David Rehkopf, Sc.D., Cancer Epidemiology
185 Berry St., Ste 5700
San Francisco, CA 94143
Phone: (415) 514-8114 email: drehkopf@psg.ucsf.edu
Office hours: By arrangement

Description:

This course extends upon the curriculum taught in Epidemiology I and II (Epi 203) to include instruction in a variety of advanced topics in epidemiologic research. Considerable attention is paid to methods of reducing confounding including matching, instrumental variables and propensity scores. The theory of causal modeling is introduced. There is also in depth instruction in quantitative bias analysis including that of misclassification, selection bias, and unmeasured confounding. Methods for accommodating missing data are also discussed.

Objectives:

The objective of the course is to establish students in the sophisticated application of epidemiologic methods. Instructional goals are achieved through weekly lecture, small group discussion sections, and literature-based problem sets.

Content:

- Effect-measure modification
- Matching
- Instrumental variables
- Propensity scores
- Introduction to causal modeling
- Quantitative analysis of misclassification
- Quantitative analysis of selection bias
- Quantitative analysis of unmeasured confounding
- Quantitative analysis of multiple biases and probabilistic bias analysis
- Missing data
Graduate Program in Epidemiology & Translational Science
University of California, San Francisco

Course Title: Genetic Epidemiology
Quarter Units: 3
Offered: Winter quarter, every other year
Director: John S. Witte Ph.D., M.S.
Professor, Division of Biostatistics
513 Parnassus Ave, S965
San Francisco, CA 94143
Phone: (415) 502-6882  email: wittej@humgen.ucsf.edu
Office hours: By arrangement

Description:

Students will develop a framework for interpreting, assessing, and incorporating genetic epidemiology in their research.

Objectives:

Design and analysis, interpretation, and implications of genetic epidemiologic research. Students will learn about the main approaches to deciphering the genomic basis of disease.

Content:

- Assess the genetic contribution to disease with studies of familial aggregation, heritability, and segregation;
- Mapping disease-causing genes with linkage and admixture studies;
- Candidate gene studies;
- Genome-wide association studies;
- Gene-environment and gene-gene interactions in disease;
- Pharmacogenomics: genetics underlying drug response;
- Ethical issues of genetic epidemiologic research, as well as clinic-based and direct-to-consumer genetic testing.

Material:

- Students will be assigned weekly journal (review) readings corresponding to the topics covered.
- Homework sets will include real data analysis problems, using the Stata software package.

Testing and Assessment:

Students will be graded on their homework assignments, class participation, and a final assignment as follows:
- Homeworks (60% total, 15% per each of four assignments);
- Class participation (10%); and Final project (30%).
Graduate Program in Epidemiology & Translational Science  
University of California, San Francisco

Course Title: Global Health Epidemiology  
Quarter Units: 3  
Offered: Spring quarter, every other year  
Director: George W. Rutherford, M.D.  
Professor, Division of Preventive Medicine and Public Health  
50 Beale St., Ste 1200  
San Francisco, CA 94143  
Phone: (415) 597-9108  email: grutherford@psg.ucsf.edu  
Office hours: By arrangement

Description:

This course will focus on teaching methods of epidemiology as applied to global health, including demography, maternal-child health, infectious and tropical diseases, under-nutrition, environmental health and chronic diseases and injury.

Objectives:

- To learn the process of estimating burden of disease and prioritizing disease control interventions  
- To understand use of survey data in global health epidemiology (e.g., Demographic Surveillance Systems, immunization coverage assessments, Demographic and Health Surveys)  
- To understand the principals of post-hoc evaluation and data synthesis used to assess the impact of global health disease control programs

Content:

- Introduction to global health epidemiology  
- Introduction to demography  
- Modeling demographic trends  
- Methods of maternal-child health and nutrition as used in global health  
- Overview of infectious disease and tropical medicine epidemiology in global health (2)  
- Overview of methods of global environmental epidemiology  
- Epidemiological practice in complex humanitarian emergencies  
- Estimating biological and economic burden of disease (2)  
- Estimating and evaluating the impact of public health control measures

Material:

Readings from the literature.  
Computer and web-based materials used to estimate burden of disease, Disease Control Priorities Project and demographic trends.
Graduate Program in Epidemiology & Translational Science
University of California, San Francisco

Course Title: Infectious Disease Epidemiology
Quarter Units: 3
Offered: Spring quarter, every other year
Director: George W. Rutherford, M.D.
Professor, Division of Preventive Medicine and Public Health
50 Beale St., Ste 1200
San Francisco, CA 94143
Phone: (415) 597-9108  email: grutherford@psg.ucsf.edu
Office hours: By arrangement

Description:

This course will focus on teaching methods of infectious disease epidemiology and epizootology, including surveillance, outbreak investigation, data triangulation and modeling.

Objectives:

- To understand use of survey data in infectious disease epidemiology (e.g., immunization coverage assessments, Demographic and Health Surveys)
- To understand how disease control interventions impact basic reproductive number and spread of infections in human, animal and pathogen populations

Content:

- Introduction to infectious disease epidemiology
- Basic reproductive rate dynamics and spread of infectious diseases in populations, pathogen genetics and selection, impact of interventions on spread
- Use of surveillance and programmatic data for estimating burden of disease and trends in disease (3 sessions)
- Sampling and estimating size of hard-to-reach populations (e.g., respondent-driven sampling, time-location sampling, capture-recapture)
- Data synthesis and triangulation
- Outbreak investigation (2 sessions)
- Modeling infectious disease events (2 sessions)
- Infectious disease epidemiology in domestic animals and wildlife

Material:

Standard textbook such as Anderson and May, Infectious Diseases of Humans
Readings from the literature
Computer and web-based materials used in modeling
Graduate Program in Epidemiology & Translational Science  
University of California, San Francisco

Course Title: Social Epidemiology  
Quarter Units: 3  
Offered: Winter quarter, every other year  
Director: David Rehkopf, Sc.D.  
Assistant Professor, Division of Cancer Epidemiology  
185 Berry St., Ste 5700  
San Francisco, CA 94143  
Phone: (415) 514-8114  email: drehkopf@psg.ucsf.edu  
Office hours: By arrangement

Description:

- This course will focus on teaching the contributions of social epidemiology to an understanding of the development of disease

Objectives:

- Be able to describe the major theories of disease distribution, and how these impact research questions
- Understand the use of race, ethnicity and region of origin as social and biological constructs
- Develop familiarity with the literature on one of the primary exposures in social epidemiology and its effects on health
- Understand aspects of causal inference that are unique to social epidemiology

Content:

- Why social epidemiology? (1 session)
- Theories of disease distribution (1 session)
- Race as a social and biological construct (2 sessions)
- Health effects and confounding by socioeconomic position (2 sessions)
- Area and neighborhood effects on health (1 session)
- Lifecourse social exposures and health (1 session)
- Gene environment interactions in social epidemiology (1 session)
- Specificity of outcomes in social epidemiology (mortality, biomarkers and gene expression) (1 session)
- Causal inference in social epidemiology (2 sessions)

Material:

- Two required textbooks will be Social Epidemiology by Berkman and Kawachi, and Methods in Social Epidemiology by Kaufman and Oakes.
- Journal articles and chapters from other text books (e.g. Modern Epidemiology, 3rd Edition by Rothman, Greenland and Lash, Health
Inequalities: Lifecourse approaches by George Davey Smith, The Health of Populations by Kunitz

Testing and Assessment

- 25% Class participation in discussion and in leading discussion of readings
- 25% Weekly 1-2 page reflections on readings
- 25% 10 page critique of journal article
- 25% 10 page final critical review paper