EPIDEMIOLOGY AND TRANSLATIONAL SCIENCE (PHD)

Visit program website. (https://epibiostat.ucsf.edu/doctoral-program-epidemiology-translational-science/)

Degree Offered: PhD
Program Leadership:
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Program Description

The Epidemiology and Translational Science PhD program is a four to five year course of study for individuals wishing to pursue independent research careers. Incoming students have typically completed training at the master's level in epidemiology, public health, or related quantitative research fields prior to entering the program. Students are trained in the most advanced methods for studying disease etiology and prevention; for evaluating diagnostic tests and treatment efficacy in clinical settings; and for implementing evidence-based approaches in clinical practice and population health.

The Department of Epidemiology and Biostatistics at UCSF is the largest of its kind in the ten-campus UC system in terms of full-time primary faculty and number of affiliated faculty. Epidemiology serves as a key discipline — an "epicenter" in team science and in problem-based learning, bridging basic and population sciences. It serves translational science with a critical perspective on population health and provides instruction on research methods that move basic scientific discoveries to practical clinical applications.

Faculty

The program has about 70 primary faculty members in the Department of Epidemiology and Biostatistics and an additional 60 affiliated faculty from other UCSF departments as well as from other institutions and organizations throughout the San Francisco Bay Area and the around the country. Affiliated faculty are associated with departments including general and internal medicine, cardiovascular medicine, pediatrics, psychiatry, obstetrics and gynecology, neurology, nursing, clinical pharmacy, biopharmaceutical sciences, radiology, and dentistry.

Areas of Concentration

- Aging (including cardiovascular disease, musculoskeletal disease, and dementia/brain aging)
- Bioinformatics
- Biostatistics
- Cancer epidemiology
- Clinical epidemiology and methods
- Environmental and occupational epidemiology
- Epidemiology of cardiovascular and neurological disorders
- Genetic epidemiology
- Global health
- Implementation Science
- Infectious disease epidemiology
- Lifecourse
- Machine learning
- Precision public health and computational epidemiology
- Reproductive, perinatal and neonatal epidemiology
- Social epidemiology

The Epidemiology and Translational Science Program is based at UCSF's Mission Bay campus. The doctoral program is housed in the Department of Epidemiology and Biostatistics (DEB) in the School of Medicine and is a joint effort with the University's Clinical and Translational Sciences Institute (CTSI).

The Epidemiology and Translational Science program is offered by the UCSF Graduate Division, administered by the UCSF School of Medicine, and delivered by faculty members in the UCSF School of Medicine.

Admission Requirements

- A prior master's degree in a field relevant to health research, such as epidemiology, public health, clinical research or a related technical field such as statistics or computer science with at least a 3.0 GPA; the following exemptions may apply:
  - Applicants with exceptional research backgrounds may be accepted without a master's degree. These students may be required, however, to complete additional coursework.
  - Applicants with terminal clinical degrees (MD, PharmD, RN, NP) but no master's will be evaluated based on their prior research experience and potential to be a leader in population health research, with the admissions committee recommending one of the following outcomes:
    - Denial of admission
    - Deferral of decision regarding admission to the PhD program with recommendation that the applicant pursue a master's in the UCSF Training in Clinical Research (TICR) program, with reevaluation of the applicant at the conclusion of year 1 in the TICR program
    - Direct admission to the PhD program, based on the assessment that the applicant's prior work manifests experience and training on par with a research master's degree
- Graduate Record Examination (GRE): Submission of GRE scores was not required for the Fall 2023 application cycle. Check the admissions webpage (https://epibiostat.ucsf.edu/admissions/) for updates regarding future admissions cycles.

Learning Outcomes

We aim to train top-tier researchers and population health leaders, prepared to pursue academic careers at highly ranked, research-intensive universities or careers within health-focused non-profit, industry, or government sectors. Our incoming students include a mix of clinicians who aim to develop expertise as clinician-scientists and non-clinicians, typically with a background in public health or epidemiology. We envision our role as both providing both theoretical frameworks to identify important health research questions and technical research skills to address these questions. The PhD program aims to prepare students to lead research on both classical epidemiologic topics, i.e., the determinants of incidence and prognosis of disease, and applied problems addressing the translation from discovery science to application, implementation, and dissemination. We view the use of epidemiologic methods and perspectives, such as rigorous quantitative analyses and multilevel determinants of health and behavior, as critical

for translational science intended to move basic scientific discoveries to practical clinical applications and dissemination of new basic and clinical knowledge to population health settings.

The program is grounded in the technical skills of epidemiology, emphasizing quantitative research methods such as study design, data science, statistical analyses, and interpretation. All students also adopt a substantive emphasis related to the topic of their dissertations and are expected to pursue deeper content area training in this domain to develop scientifically relevant research questions. These areas are generally aligned with recognized subdomains of epidemiology and intended to match faculty expertise so students can receive the highest degree of topic-related mentoring.

The following competencies are covered in the core section of the qualifying examination:

a. Modern causal inference frameworks
b. Study design
c. Sampling and data sources
d. Measurement development and validation
e. Sources of bias and contemporary tools to remediate bias e.g., confounding, selection bias, and information bias
f. Statistical analyses and interpretation
g. Surveillance, outcomes, and measuring public health impact

Additional Information
Program Core Faculty
- *Find a* program faculty list *(*https://epibiostat.ucsf.edu/faculty/*) on the program website.*

Career Outcomes
- *Find* career outcomes and other data on PhD programs *(*https://graduate.ucsf.edu/program-statistics/#career*) on the Graduate Division website.*

Degree Requirements
- Minimum GPA of 3.0
- All core courses and required activities taken and passed
- Six quarters in residence including a minimum of three registered quarters after advancement to candidacy
- Pass qualifying examination
- Completion and submission of the dissertation
- For additional details, please see: graduate.ucsf.edu/phd-degree (https://graduate.ucsf.edu/phd-degree/)

Core Courses

Course	Title	Units
Year 1		
Fall		
BIOSTAT 200	Biostatistical Methods in Clinical Research I	3
EPIDEMIOL 203	Epidemiologic Methods	4
EPIDEMIOL 204	Clinical Epidemiology	3
EPIDEMIOL 270	Doctoral Seminar in Epidemiology and Translational Science	1
	Units	**11**
Winter		
BIOSTAT 208	Biostatistical Methods II	3
EPIDEMIOL 207	Epidemiologic Methods II	3

EPIDEMIOL 270	Doctoral Seminar in Epidemiology and Translational Science	1
	Units	**7**
Spring		
BIOSTAT 209	Biostatistical Methods III	3
EPIDEMIOL 265 or EPIDEMIOL 268	Research Methods in Chronic Disease Epidemiology [1] or Econometric Methods for Causal Inference	3
EPIDEMIOL 270	Doctoral Seminar in Epidemiology and Translational Science	1
EPIDEMIOL 297	Research Rotation in Epidemiology & Translational Science [2]	1-4
	Units	**8-11**
Summer Term		
First Year Diagnostic		
	Units	**0**
Year 2		
Fall		
BIOSTAT 210	Biostatistical Methods IV	2
EPIDEMIOL 270	Doctoral Seminar in Epidemiology and Translational Science	1
EPIDEMIOL 296	Independent Study in Epidemiology and Translational Science [3]	1-4
EPIDEMIOL 297	Research Rotation in Epidemiology & Translational Science [2]	1-4
	Units	**5-11**
Winter		
BIOSTAT 211	Mathematical Foundations of Biostatistics	2
EPIDEMIOL 270	Doctoral Seminar in Epidemiology and Translational Science	1
	Units	**3**
Spring		
BIOSTAT 215	Strengthening causal inferences based on observational data	3
EPIDEMIOL 265 or EPIDEMIOL 268	Research Methods in Chronic Disease Epidemiology [1] or Econometric Methods for Causal Inference	3
EPIDEMIOL 270	Doctoral Seminar in Epidemiology and Translational Science	1
EPIDEMIOL 296	Independent Study in Epidemiology and Translational Science [3]	1-4
	Units	**8-11**
Summer Term		
Qualifying Examination, Part 1		
	Units	**0**
Year 3		
Fall		
EPIDEMIOL 299D	Dissertation Research	8
EPIDEMIOL 270	Doctoral Seminar in Epidemiology and Translational Science	1
Qualifying Examination, Part 2 (may continue through year 3, winter and spring)		
	Units	**9**
Winter		
EPIDEMIOL 299D	Dissertation Research	8
EPIDEMIOL 270	Doctoral Seminar in Epidemiology and Translational Science	1
	Units	**9**
Spring		
EPIDEMIOL 299D	Dissertation Research	8
EPIDEMIOL 270	Doctoral Seminar in Epidemiology and Translational Science	1
Advancement to Candidacy		
	Units	**9**

Year 4

Fall

EPIDEMIOL 299D	Dissertation Research	8
EPIDEMIOL 270	Doctoral Seminar in Epidemiology and Translational Science	1
	Units	**9**

Winter

EPIDEMIOL 299D	Dissertation Research	8
EPIDEMIOL 270	Doctoral Seminar in Epidemiology and Translational Science	1
	Units	**9**

Spring

EPIDEMIOL 299D	Dissertation Research	8
EPIDEMIOL 270	Doctoral Seminar in Epidemiology and Translational Science	1
	Units	**9**

Year 5

Fall

EPIDEMIOL 299D	Dissertation Research	8
EPIDEMIOL 270	Doctoral Seminar in Epidemiology and Translational Science	1
	Units	**9**

Winter

EPIDEMIOL 299D	Dissertation Research	8
EPIDEMIOL 270	Doctoral Seminar in Epidemiology and Translational Science	1
	Units	**9**

Spring

EPIDEMIOL 299D	Dissertation Research	8
EPIDEMIOL 270	Doctoral Seminar in Epidemiology and Translational Science	1
	Units	**9**
	Total Units	**123-135**

[1] EPIDEMIOL 265 Research Methods in Chronic Disease Epidemiology (odd years) or EPIDEMIOL 268 Econometric Methods for Causal Inference (even years)

[2] Research Rotation – may be any quarter through 2nd year

[3] Teaching Assistantship - may be any quarter

Approved Electives

This list is not exhaustive. Additional courses offered in other UCSF departments, through the University of California Intercampus Exchange program at UC Berkeley, and the Stanford University-UCSF Exchange Program are routinely approved if the courses are aligned with the student's scientific goals.

Code	Title	Units
Data Sources and Bioinformatics		
BIO MD INF 203	Biocomputing Algorithms	4
BIO MD INF 206	Statistical Methods for Bioinformatics	4
BIO MD INF 219	Special Topics in Bioinformatics (Computational Immunology)	3
BIO MD INF 219	Special Topics in Bioinformatics (Deep Learning)	3
BIO MD INF 219	Special Topics in Bioinformatics (Microbiome Research)	3
BIO MD INF 219	Special Topics in Bioinformatics (Neurodegenerative Disease Mechanisms)	3
BIOSTAT 212	Introduction to Statistical Computing in Clinical Research	1
BIOSTAT 213	Programming for Health Data Science in R	2
BIOSTAT 216	Machine Learning in R for the Biomedical Sciences	3
EPIDEMIOL 218	Data Collection and Management for Clinical Research	1
EPIDEMIOL 226	Informatics Tools for Health Disparities Research	2
EPIDEMIOL 231	Use of Electronic Health Records Data for Clinical Research	3
Epidemiologic Methods		
EPIDEMIOL 202	Designing Clinical Research (Two Month)	2
EPIDEMIOL 205	Clinical Trials	2
EPIDEMIOL 214	Systematic Reviews	1
Genetic Epidemiologic Methods		
BIO MD INF 219	Special Topics in Bioinformatics (Disparities in human genetic research and health care across people with different ancestries)	3
EPIDEMIOL 217	Molecular & Genetics Epidemiology I	2
Biostatistical Methods		
BIOSTAT 202	Opportunities and challenges of complex biomedical data	3
BIOSTAT 216	Machine Learning in R for the Biomedical Sciences	3
DATASCI 225	Advanced Machine Learning for the Biomedical Sciences II	3
Subject Matter-Specific Methods		
EPIDEMIOL 210	Epidemiology of Aging	2
EPIDEMIOL 222	Social Determinants of Health and Health Disparities	1-2
EPIDEMIOL 252A	Cancer Epidemiology	2
EPIDEMIOL 252B	Cancer Epidemiology	1
EPIDEMIOL 253	Methods in Infectious Disease Epidemiology	2-3
EPIDEMIOL 263	Demographic Methods for Health	1.5
Cost-Effectiveness Analysis		
EPIDEMIOL 213	Cost-Effectiveness Analysis in Medicine and Public Health	2
Implementation Science		
EPIDEMIOL 241	Designs for Intervention Research in Real-World Settings	2
EPIDEMIOL 242	Program Evaluation in Clinical and Public Health Settings	2
EPIDEMIOL 243	Human Centered Design	2
EPIDEMIOL 245	Introduction to Implementation Science: Theory and Design	2
EPIDEMIOL 246	Designing Individual-Level Implementation Strategies	2
EPIDEMIOL 247	Designing Interventions to Change Organizational Behavior	2
EPIDEMIOL 248	Community-Engaged Research	2

EPIDEMIOL 249	Translating Evidence Into Policy	2
EPIDEMIOL 267	Qualitative and Mixed Methods Research	2
Practical/Professional Skills		
EPIDEMIOL 212	Publishing and Presenting Clinical Research	1
Graduate Division		
GRAD 202	Racism in Science	3
GRAD 210	Justice, Equity, Diversity and Inclusion Academic Leadership	4
GRAD 214	Responsible Conduct of Research and Rigor & Reproducibility	1.5
GRAD 219A	Special topics in racism and social justice in science	3
GRAD 219B	Special topics in racism and social justice in science	3
GRAD 219C	Special topics in racism and social justice in science	3

Non-course Core Requirements

- Unit requirement: 52 units
- The First Year Diagnostic will assess mastery of year one core coursework and is taken at the end of year one.
- Research Team Rotations: Students are 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). Research team rotations are focused on either analysis (analytic rotations) or generation of data (nonanalytic rotations). In analytic rotations, the experience should include direct manipulation of data, including drafting of statistical analysis code. In nonanalytic rotations, the focus will be on nonanalytic aspects of conducting research, including design, start-up, recruitment, measurement (in wet lab or other setting), data management, and/or regulatory and financial tasks. The objective of these rotations is for the student to have the opportunity to:
  - Apply concepts taught in formal classes
  - Learn practical aspects of conducting research, including how to work within a multidisciplinary team
  - Acquire exposure to areas of research other than the student's primary area
  - Launch projects with potential for developing into qualifying examination or dissertation research topic
  - Decide on a dissertation mentor, if not already identified
- Teaching Assistantships: Students are expected to participate as a teaching assistant (TA) in two basic Training in Clinical Research courses. Students will typically serve as a TA in one Epidemiology course (i.e., EPI 150.03, 202, 203, 204, 205, 207, 211, 213, 217, 245, 265, or 268) and in one Biostatistics course (i.e., BIOSTAT 200, 208, 209, 212, or 215) over a two-year period starting in the second or third year. In most cases, students will have taken these courses in the first or second year.
- Pass two-part written qualifying examination. The "Core Content" section (part one) will assess mastery of core epidemiologic methods. The "Topical" section (part two) will establish a level of expertise related to the student's anticipated research focus.
- Dissertation and dissertation defense: three first-authored manuscripts developed with the mentorship and oversight of the dissertation committee and approved by the committee as publishable in the peer-reviewed literature.