

Graduate Student Handbook
2023-2024

Computational
PRECISION HEALTH

Berkeley | UCSF

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Welcome

Welcome to the UCSF- UC Berkeley Joint Computational Precision Health (CPH) PhD program. CPH is led by faculty Directors [Dr. Maya Petersen](#) (UCB) and [Dr. Ida Sim](#) (UCSF), under the auspices of the Chancellors of each university. Faculty who are appointed in the CPH Joint Program are within the [Division of Computing, Data Science, and Society](#) at UCB and the Executive Vice Provost's office at UCSF.

The core of UCSF- UC Berkeley Joint Computational Precision Health (CPH) PhD program is a new and novel [Augmented Graduate Group](#) (AGG) that functions as a bi-campus department. CPH faculty include faculty with primary appointments in CPH, as well as faculty with primary appointments across multiple Departments and Schools on both campuses.. This handbook is intended to serve as a resource for PhD students in the UCSF- UC Berkeley Joint Computational Precision Health (CPH) PhD program. It is recommended that students read the handbook at the start of the program, or to refer to it during their academic career for specific information about policies and resources.

Again, welcome to CPH and the best of luck during your academic career!

Mission and Objectives

The educational mission is to leverage and bridge complementary expertise and distinct cultures of UCSF and UC Berkeley to offer a world-leading graduate training program in Computational Precision Health; to support faculty and students with new avenues for transdisciplinary collaborations, anchored in the strengths of both campuses; to establish a unique shared learning environment across campuses in close collaboration with existing programs; and to provide a robust intellectual home and research-focused education and training opportunity for jointly-raised scholars to apply discoveries in clinical and population health settings equitably and effectively.

We are committed to Diversity, Equity, Inclusion, & Belonging: The promises of computation for health should be available to all persons regardless of personal or group characteristics. For CPH training and research impacts to be equitable, we commit to promoting diversity, equity and inclusion in the realms of research, teaching, and/or service. We recognize the intrinsic relationship between diversity and excellence in all our endeavors and embrace open and equitable access to opportunities for learning and development as our obligation and goal.

Land Acknowledgements

We recognize that UC Berkeley sits on the territory of xučyun (Huichin), the original landscape of the Chochenyo speaking Ohlone people, the successors of the sovereign Verona Band of Alameda County. Read our full land acknowledgement on the [Centers for Educational Justice & Community Engagement website](#).

We at UCSF acknowledge the Ramaytush Ohlone people, who are the traditional custodians of this land. We pay our respects to the Ramaytush Ohlone elders, past, present, and future, who call this place, the land that UCSF sits upon, their home. We are proud to continue their tradition of coming together and growing as a community. We thank the [Ramaytush Ohlone community](#) for their stewardship and support, and we look forward to strengthening our ties as we continue our relationship of mutual respect and understanding.

University Publications

UC Berkeley Graduate Division Handbook

The office of the Graduate Division at UC Berkeley publishes a [Graduate Student Handbook](#) each year with information about campus resources, systems and processes for new students. Incoming students are encouraged to review the handbook prior to the start of the entering fall semester.

UCSF New Student Information by The Graduate Division

The office of the Graduate Division at UCSF lists all systems and processes on the [New PhD Program Information website](#). On this page, students will also be able to review a Virtual Orientation and learn about all UCSF student resource offices, including the Student Health Information Program, Ombuds office, family resources, perks and more.

UC Berkeley Academic Guide

The [Berkeley Academic Guide](#) is published each year with updated program information, course and requirement information. Students can find a listing of all courses and descriptions and have access to the [Course Catalog](#), [Class Schedule](#) and [Academic Calendar](#).

UCSF General Catalog

The UCSF is published each year with updated schools, academic program information, course listings, and university support offices. Students can find a listing of all courses and have access to the [Course Catalog](#), and [Academic and Administrative Calendars](#).

Department Leadership & Advising

Department Leadership

Program Chairs- Ida Sim, UCSF and Maya Petersen, UC Berkeley

Executive Director- Daniel Wolfe

Senior Administrative Officer- Rhiannon Lewis

Joint Augmented Graduate Group (AGG) Members

The joint Augmented Graduate Group in Computational Precision Health (CPH) establish and administer a graduate program of instruction and research leading to either a PhD in Computational Precision Health (joint between UC Berkeley and UCSF) or a Designated Emphasis (DE) in Computational Precision Health (distinct DEs administered by each campus).

UCSF (UCSF Co-Director, Ida Sim)

Core Faculty

1. Julia Adler-Milstein, PhD, Professor of Medicine (Hospital Medicine)
2. Sergio Baranzini, PhD, Professor of Neurology
3. Atul Butte, MD, PhD, Professor of Pediatrics; Director, Bakar Computational Health Sciences Institute
4. Yoshimi Fukuoka, RN, PhD, FAAN, Professor of Physiological Nursing, School of Nursing
5. Julian Hong, MD, MS, Assistant Professor of Radiation Oncology
6. Yulin Hswen, ScD, MPH, Assistant Professor of Epidemiology & Biostatistics
7. John Kornak, PhD, Professor of Epidemiology & Biostatistics
8. Courtney Lyles PhD, Associate Professor of Medicine (also an Associate Adjunct Professor, School of Public Health, Berkeley)
9. Anobel Odisho, MD, MPH, Assistant Professor of Urology
10. Mark Pletcher, MD, MPH, Professor of Epidemiology & Biostatistics
11. Aaron Scheffler, PhD, Professor of Epidemiology & Biostatistics
12. Marina Sirota, PhD, Associate Professor of Pediatrics
13. Gilmer Valdes, PhD, Assistant Professor of Radiation Oncology

Affiliate Faculty

14. William Brown, PhD, Assistant Professor of Medicine (Prevention Sciences)
15. Aaron Neinstein, Associate Professor of Medicine
16. Romain Pirracchio, MD, PhD, Professor and Chief, Clinical Anesthesiology, Zuckerberg San Francisco General Hospital
17. Aenor Sawyer, MD, Assistant Clinical Professor of Orthopedics

UCB (UCB Co-Director, Maya Petersen)

Core Faculty

18. Ahmed Alaa, Assistant Professor, Computational Precision Health UCSF / UC Berkeley
19. Gopala Anumanchipalli, Assistant Professor in Electrical Engineering and Computer Sciences at UC Berkeley; Dept. of Neurosurgery at UCSF
20. Anil Aswani, Associate Professor in the Department of Industrial Engineering and Operations Research, College of Engineering
21. Jennifer Chayes, Associate Provost, Division of Computing, Data Science, and Society, Dean of School of Information
22. Irene Chen, Assistant Professor, Computational Precision Health UCSF / UC Berkeley
23. Haiyan Huang, Professor of Statistics and Director of the Center for Computational Biology, Division of Computing, Data Science, and Society
24. Nilah Ioannides, Assistant Professor of Electrical Engineering and Computer Sciences and the Center for Computational Biology, College of Engineering and Division of Computing, Data Science, and Society
25. Michael Jordan, Professor in the Departments of Electrical Engineering and Computer Sciences and Statistics, College of Engineering and Division of Computing, Data Science, and Society
26. Jon Kolstad, Associate Professor in the Haas School of Business
27. Chunlei Liu, Associate Professor in the Helen Wills Institute for Neuroscience and the Department of Electrical Engineering and

Computer Sciences, College of Engineering and Division of Computing, Data Science, and Society

28. Ziad Obermeyer, Associate Professor of Health Policy and Management, School of Public Health
29. Stuart Russell, Professor of Electrical Engineering and Computer Sciences, College of Engineering and Division of Computing, Data Science, and Society
30. Adam Yala, Assistant Professor, Computational Precision Health UCSF / UC Berkeley
31. Yun Song, Professor in the Departments of Electrical Engineering and Computer Sciences and Statistics, College of Engineering and Division of Computing, Data Science, and Society
32. Mark van der Laan, Professor of Biostatistics and Statistics, Division of Computing, Data Science, and Society

Affiliate Faculty

33. David Bamman, Associate Professor in the School of Information, Division of Computing, Data Science, and Society
34. Joshua Blumenstock, Associate Professor in the School of Information, Division of Computing, Data Science, and Society
35. Xin Guo, Professor Associate Professor in the Department of Industrial Engineering and Operations Research, College of Engineering
36. Liana Lareau, Assistant Professor in the Department of Bioengineering, College of Engineering
37. Michael Lustig, Professor of Electrical Engineering and Computer Sciences, College of Engineering and Division of Computing, Data Science, and Society
38. Sam Pimentel Assistant Professor in the Department of Statistics, Division of Computing, Data Science, and Society
39. Elizabeth Purdom Associate Professor in the Department of Statistics, Division of Computing, Data Science, and Society
40. Bin Yu, Professor of Statistics and Electrical Engineering and Computer Sciences, College of Engineering and Division of Computing, Data Science, and Society

Student Advising and Mentoring

The student advising model is based on assignment of an initial Academic Advisor at time of matriculation, with transition to a Research Advisor (or co-Advisors) at some point during the first two years of study (typically in the second year during the process of research rotations). The Research Advisor (or co-Advisors) will serve as the student's Dissertation Chair (or co-Chairs). Students will not be expected to have identified an Academic or Research Advisor at time of application. Students will transition to a Research Advisor by the start of the third semester.

Students will be assigned to an initial Academic Advisor at student orientation one week prior to the beginning of instruction. The Academic Advisor will be a core member of the Augmented Graduate Group in Computational Precision Health. Assignment of preliminary advisors to matriculating students will be done by the Program Co-Directors, based on considerations including current advising load of the faculty and the interests and academic background of the student. The Academic Advisor will meet with the student on at least three occasions in the first year: (1) at orientation one week prior to the beginning of instruction to select course work (students will enroll in additional courses during the adjustment period) and advise on rotation plans; (2) near the completion of the Fall semester to review performance in courses, select Spring courses, and advise on rotation plans; and (3) at the approximate midpoint of the Spring semester to discuss summer plans, support finalization of selection of a Research Advisor, and help connect the student to potential research and internship possibilities. Core CPH faculty with 100% appointments within the CPH AGG (Type 1 core faculty) will serve as Academic Advisors, with an expected academic advising load of 2 first year students per faculty member. Faculty workload will be a key consideration as the program increases its student enrollment.

Selection of the Research Advisor or co-Advisors will occur through mutual interest and agreement of the student and faculty members and will occur by the start of the third semester to allow ample time for preparation for the Qualifying Exam. Midway through the second semester, the Graduate Student Affairs Officer will work proactively with the Academic Advisors to identify any students without a trajectory towards placement with a Research Advisor, and will work to secure a placement in close consultation with the Program co-Directors. While the exact meeting schedule between students and Research Advisors will be at the discretion of the Research Advisor and student, Research Advisors are expected to work closely with the student throughout the duration of the program, and provide intensive mentoring in support of the student's dissertation, as well as academic advising regarding additional required coursework (primarily during the second year) and general career development. The frequency of these meetings is expected to evolve over the course of the students' training, but is expected to consist of at least 5 meetings per academic semester.

The Research Advisor or co-Advisors will serve as the student's Dissertation (co-)Chairs. While not anticipated to occur frequently, students are permitted to transition Research Advisors during their course of study if their research direction evolves. The program will not require co-Advising; however, a model of co-primary advising is expected to occur frequently given the

inherently multidisciplinary nature of the program, and will be supported and encouraged (see requirements for Dissertation committee membership below).

In addition to the Academic and Research Advisors, the program will support and encourage students in the creation of wide and diverse mentor networks, through activities including guest lectures in the Doctoral Seminar (followed by receptions to allow informal conversation), faculty consultation in the Problem-Based Learning Cornerstone series, and retreats including core and affiliated faculty.

Particular attention will be paid to career mentorship needs of BIPOC and first-generation graduate students and faculty. The UCSF [Office of Mentoring](#) provides mentoring resources and training for mentors and mentees alike. Directed by the Program Co-Directors, the CPH Student Affairs team will track and ensure substantive, fair, and effective student mentorship.

Department Advising Contacts

Graduate Student Affairs Officer (GSAO)- Bianca Victorica

Head Graduate Advisor (HGA)- Maya Petersen, CPH Co-Director

Equity and Inclusion Officer- Irene Chen, CPH Assistant Professor

New Students

Accepting Admission

Students must officially accept admissions by completing the “Reply to Offer of Admission” form. In year one, students will accept admissions and be matriculated at UC Berkeley. Once the official form is complete, students must also submit the [UCSF Supplemental Applicant Form](#) by no later than June 1st. This form will create a student profile at UCSF and allow access to campus-specific resources.

Statement of Intent to Register (SIR)

The admission offer from the Graduate Division Admissions Office to new graduate students contains a Statement of Intent to Register (SIR) that must be submitted online. Only the submission of the SIR indicating an intention to register will reserve the registration slot allocated to admitted students. A completed SIR will allow for official matriculation and access to the university systems.

New students will be matriculated by the Graduate Admissions Office by July 1, prior to their first semester. Once matriculated, students will have access to UC Berkeley’s [CalCentral](#) and UCSFs [Student Portal](#).

Getting Started

Once matriculated, students will receive their Student Identification Number (SID). This number will be used to [set up a berkeley.edu email address](#)/ CalNet ID, get a [Cal1 Card](#), and to access CalCentral. CalCentral will guide new students by listing tasks and deadlines in the CalCentral dashboard. Students should complete all tasks, including the [SVSH mandatory training](#), immunization and TB screening requirements, and any task with a deadline.

The Graduate Division will host a New Graduate Student Orientation (NGSO) at UC Berkeley during the first week of the fall semester. Students can find information about these events by visiting the [Graduate Division website](#).

Once students are matriculated, you can sign up for important listservs such as CalMessages at the UC Berkeley campus. UCSF will automatically add you to the student listserv to stay up to date with policy changes, events, workshops, fellowships and important university news.

Student ID cards

Students will need access to both the UC Berkeley and UCSF campuses. We encourage students to request their Student ID cards as soon as their student profiles are complete in CalCentral at Berkeley and the Student Portal at UCSF.

Cal 1 Card is the required campus **ID card** at **UC Berkeley**, allowing access to buildings, debit accounts, meal plans, and university services. For appointments to receive your UC Berkeley Cal 1 Card access: <https://cal1card.berkeley.edu/get-a-cal-1-card/>

All **UCSF students** need a **UCSF photo ID card**. Students are required to display their UCSF ID card at all times while on premises that UCSF owns or operates. For appointments to receive your UCSF Photo ID Card: <https://registrar.ucsf.edu/new-students/weid>

Registration

How to Register for Classes

In the first year, CPH students must register at UC Berkeley. To be officially registered, students enroll in at least one class and at least 20% of tuition and fees must be paid by the due date. Students with an active hold will not be able to register and must contact their department for guidance. Graduates students are encouraged to meet with the GSAO to confirm appointment and/or fellowship tuition/fees disbursement.

While at UC Berkeley, enrollment happens through [CalCentral](#). Students should watch the [Cal Central: Course Enrollment](#) video to assist with enrollment. Students will be registered at UC Berkeley during the first year, but will be required to take the mandatory Year 1 CPH Cornerstone series. After year 1, when a student and faculty determine the home campus, registration and enrollment will occur at that campus. For students whose home campus is UCSF, course enrollment will transition to the UCSF *Student Portal* which is an equivalent

system to CalCentral. Each semester, students must enroll in 12 units. This can be a combination of courses required by CPH, electives, and research units.

Students taking courses at UC Berkeley will see those courses added to their UCSF transcripts once grades are exchanged between each campus' Registrar's Office. We recommend that students periodically review their transcripts to make sure they have been updated. Any issues should be discussed with the Graduate Student Affairs Officer.

Fees by Campus

UC Berkeley- Graduate: Academic

	Residents	Nonresidents
Tuition 2022- 2023	5,850.00	5,850.00
Student Services Fee	576.00	576.00
Berkeley Campus Fee	717.00	717.00
Class Pass Fee - Transit	95.00	95.00
Nonresident Supplemental Tuition	N/A	7,551.00
Health Insurance Fee	3,186.00	3,186.00
Continuing Student Total	\$ 10,424.00	\$ 17,975.00
Document Management Fee - Masters	102.00	102.00
New Masters Total	\$ 10,526.00	\$ 18,077.00
Document Management Fee - Doctoral	128.00	128.00
New Doctoral Total (Semester)	\$ 10,552.00	\$ 18,103.00

*Some or all instruction for all or part of the Academic Year may be delivered remotely. Tuition and fees have been set regardless of the method of instruction and will not be refunded in the event instruction occurs remotely for any part of the Academic Year. Figures for tuition and fees represent currently approved or proposed amounts and may not be final. Actual **tuition and fees are subject to change** by the University of California as determined to be necessary or appropriate.*

UCSF- Graduate Division

Fee Type	Annual	Fall Quarter	Winter Quarter	Spring Quarter
Student Services Fee	\$1,152.00	\$384.00	\$384.00	\$384.00
Tuition	\$11,700.00	\$3,900.00	\$3,900.00	\$3,900.00
Community Centers Facility Fee	\$198.00	\$66.00	\$66.00	\$66.00

UC Graduate and Professional Council	\$0.00	\$0.00	\$0.00	\$0.00
Graduate and Professional Student Association	\$27.00	\$9.00	\$9.00	\$9.00
Associated Students Graduate Division	\$36.00	\$12.00	\$12.00	\$12.00
Student Health Insurance Premium	\$6,569.00	\$2,190.00	\$2,190.00	\$2,189.00
Student Health and Counseling Supplemental Fee	\$177.00	\$59.00	\$59.00	\$59.00
California Resident Total	\$19,859.00	\$6,620.00	\$6,620.00	\$6,619.00
Nonresident Supplemental Tuition*	\$15,102.00	\$5,034.00	\$5,034.00	\$5,034.00
California Nonresident Total	\$34,961.00	\$11,654.00	\$11,654.00	\$11,653.00

Late Registration

If students fail to enroll through CalCentral by the end of the fifth week of instruction, already active students must file a Petition for Late Enrollment/Registration to enroll in classes, available from the Office of the Registrar. Inactive students (e.g. after a withdrawal period) will need to apply for re-enrollment and should start by contacting their department's GSAO.

A late registration fee of \$150 is charged to all students who are not officially registered by Friday of the third week of instruction in fall and spring terms.

Add/Drop Fees

A late add fee of \$5 per course is charged to students who add classes after the Friday of the third week of instruction. A late drop fee of \$10 per course is charged to students who drop classes after the Friday of the second week of instruction.

Advance to Candidacy

After students pass the qualifying exam, they are encouraged to advance to candidacy as soon as their Dissertation Committee has been determined by compiling the Application for Candidacy to the Doctoral Degree ([Plan A or B](#)) eform to the Graduate Degrees Office. Students

must file this form no later than the end of the semester after the semester in which the student passed the Qualifying Examination. A \$90 Advancement to Candidacy Fee is required.

In Absentia

In absentia status is a form of registration available to academic and professional graduate students undertaking coursework or research related to their degree programs outside of California. *In absentia* registration replaces leaves taken for research purposes outside the state of California. Students registered *in absentia* are only assessed full health insurance fees, and 15 percent of the combined University Tuition and Student Services Fees. If applicable, students are also assessed nonresident tuition and/or professional school fees.

Doctoral students may only use *in absentia* registration for a maximum of four semesters; and must normally be advanced to candidacy by the time *in absentia* begins. Students may hold University fellowships and GSR appointments while registered *in absentia*, but may not hold GSI, Reader, or Tutor appointments. Students request *in absentia* registration by submitting the [Special Enrollment Petition eForm\(PDF file\)](#) through CalCentral.

Filing Fee

The Filing Fee is a reduced fee, one-semester status in lieu of registration for doctoral students who have completed all requirements for the degree except for filing the dissertation.

The Filing Fee is not a form of registration nor is it equivalent to registration. If students wish to use University services that are supported by registration fees, they must pay those fees. Students on Filing Fee status are not eligible to receive university funding or hold academic appointments (e.g., GSI or GSR) because they are not registered.

The Filing Fee may be used only once during a student's career. If a student does not file the dissertation during the semester for which the Filing Fee is approved, the student must apply for readmission and pay regular registration fees during a subsequent semester to complete the requirements.

Graduate students who are approved for Filing Fee status will be assessed a [Filing Fee of \\$288](#).

Students must follow the Filing Fee instructions for their home campus.

[Filing Fee instructions for UC Berkeley](#)

[Filing Fee instructions for UCSF](#)

Enrollment at UC Berkeley

Each semester students will be assigned an enrollment appointment date which can be viewed in CalCentral. There will then be an open enrollment/drop period which will end the Friday of the second week of instruction where no fee will be applied. Any drops thereafter will incur a \$10 late fee. Students will be able to make changes to their schedule and add classes through the Friday of the third week of instruction at no cost. Adds can still be made via CalCentral after the third week, but will incur a \$5 late fee. Students will be able to add, drop, and/or change units

with a fee through the end of the fifth week. Any changes after the Friday of the fifth week of instruction will need to be made by completing the [Graduate Petition to Change Class Schedule](#) and submit it to the GSAO by the Monday of the last week of instruction.

Enrollment at UCSF

Prior to each quarter in which we expect students to enroll by filing their [study list](#). Study list filing normally opens 7 weeks prior to the start of the quarter. The registrar's office will notify students by e-mail that registration information, deadlines, and fee statements are available. Students are encouraged to review the "Summary" tab in the [student portal](#) for their enrollment deadline.

Each quarter to students must complete the following to register:

1. Log in to the [student portal](#) and check your fees statement;
2. Check the "Summary" tab or "Holds" tab for registration [holds](#)
3. Enroll in courses (file your study list) by your deadline
4. If necessary, update your address and [expected graduation term](#)

After study list filing opens, you can add courses, drop courses, and, for some courses, change the instructor, units, or grading option. You can make these changes online on the "Study List" tab in the student portal until study list filing closes. Please review the [study list filing dates](#).

To change the study list after the study list filing period closes, students can submit an online petition via the "Study List" tab in the student portal. Requests will be routed electronically to the designated approvers for your program. Change requests for prior terms, or requests submitted after the 7th week of instruction in the current term, are normally declined unless there is a compelling reason to approve; students should discuss late requests to the GSAO/ program manager prior to submitting petitions.

If students do not file a study list by the date on which study list filing closes, they will need to add courses via petition; petitions are initiated on the "Study List" tab in the student portal. Failure to complete all registration requirements by the end of the third week of instruction in any term will lead to the registration for the term being canceled.

Student Health Insurance Program (SHIP)

All registered students may use University Health Services for comprehensive outpatient primary care as well as counseling services. All students are required, as a condition of registration, to have major medical health insurance to cover hospitalization and other care outside UHS. Students are automatically enrolled in the Student Health Insurance Plan (SHIP), administered by UHS, and assessed fees for SHIP. SHIP coverage is year-round and worldwide and includes coverage for medical, dental, vision, and mental health services. SHIP coverage periods are August 15-January 14 for the fall semester and January 15-August 14 for the spring semester.

Students may waive enrollment in SHIP if they have comparable major medical insurance. Deadlines for submission of waiver forms must be met in order to receive credit for the health insurance fee.

Continuing students covered by SHIP during the spring term may use UHS services during the summer. Students not registered spring term but registered in Summer Sessions are not eligible for SHIP coverage, but may use UHS services. Students who are without SHIP and not enrolled in a Summer Session course will be charged fees for all UHS services.

Establishing CA Residency

Graduate students who are US citizens are expected to establish California residency after their first year. In order to meet the residency requirements, students must be in an eligible immigration status and satisfy the “Physical Presence” and “Intent to Remain in California” requirements by the residence determination date, which is the first day of instruction.

International students unable to establish CA residency incur an additional Non Resident Student Tuition (NRST) fee each semester. CPH may pay this fee for up to a maximum of two years, as delineated in each student’s formal offer letter. Students are expected to advance to candidacy at the end of two year, at which time they will be eligible for a waiver of NRST. The graduate Division will waive NRST for international students for a maximum of three calendar years after advancing to candidacy. The NRST will once again continue after the 3 year NRST waiver.

Academic & Enrollment Calendars

UCBerkeley functions on a semester basis while UCSF follows the quarter calendar. CPH recommends students be aware of the academic and enrollment calendars for both UC Berkeley and UCSF campuses. Please review the calendars below:

[UCSF Academic and Administrative calendar](#)

[UC Berkeley Enrollment and Academic calendar](#)

Facilities

The Computational Precision Health PhD program is located in Warren Hall, Suite 120, 2195 Hearst Avenue, Berkeley, CA 94720 and at Wayne & Gladys Valley Center for Vision, 490 Illinois St, Floor 6, San Francisco, CA 94158.

Academic Overview

PhD Courses and Requirements

All Computational Precision Health PhD students will be expected to complete a core curriculum of at least 26 units of academic coursework, in addition to practicum, doctoral seminars, and research rotations constituting at least 20 units. Specific course work will vary from student to student; however, as described below, requirements will ensure that academic coursework is completed in both the computational and health sciences domains, and is completed at both the UC Berkeley and UCSF campuses. The curriculum will typically take four semesters or six quarters to complete, although a fifth semester (summer quarter) may be required, at the discretion of the student's Faculty Advisor. During the first two years, students will earn units through a combination of academic coursework and research rotations. Units in the third year and beyond will typically be earned through dissertation research. Specific unit requirements include:

CPH 200A, 200B and 200C: Computational Precision Health Cornerstone course series (3 quarters units x 3 quarters). This three quarter course series offered at UCSF will be taken during the first year of the program. The series is based on small interdisciplinary teams working together through four projects covering topics such as data analysis; problem identification and ideation; and integration of CPH into care and research contexts. The Cornerstone series will build students' ability to work effectively in interdisciplinary teams from ideation to development, testing, and validation in the real world. This course series will be required and will be open only to members of the CPH PhD program.

CPH 201 Computational Precision Health Practicum (2 units x 2 semesters). This 2-semester course series will be taken during the second year of the program, augmenting the Cornerstone course to provide deep and continuing exposure to the clinical and public health contexts in which CPH advances are to be deployed. Students will have in-depth real world exposure relevant to problem areas covered in the Problem-Based Learning core, including clinical, research, and operational work in inpatient, outpatient, community health, and/or public health settings. Embeddings will be customized to the needs and interests of the student cohort. Importantly, all practicums will be conducted outside the classroom supplemented by virtual presentations; examples of settings include but are not limited to: hospitals, primary care clinics, health insurance companies, (low income) federally qualified health centers (FHQCs), community-based vaccination sites, and local and state health departments. This practicum series will be required, and will be open only to students of the CPH PhD program.

CPH 215: Research Lab Rotation course (2 semesters, 1-8 units) During the first-year, CPH graduate students will be introduced to experimental methods and research approaches in the different areas of Computational Precision Health. Ten week laboratory rotations spread out over the fall and spring semesters (summer will be on a needed basis). Research is conducted under the direction of an individual faculty member. CPH graduate students will determine their permanent lab and campus at the completion of these rotations.

CPH 270: Computational Precision Health Doctoral Seminar (2 Units x 6 semesters).

Doctoral students will be required to attend and participate in at least six semesters of the doctoral seminar, two of which must be during their first two semesters after matriculation. The seminar will also be open to PhD students in other programs who are enrolled in either of the campus-specific Designated Emphasis in Computational Precision Health (and will be formally approved and listed on both campuses) Only two semesters of the CPH seminar will be required; 2) The practicum and rotations will not be required. Thus, as detailed below, a minimum of 26 units of academic coursework and 4 units of CPH Doctoral Seminar are required for this plan.

GRAD 202: Race and Racism in Science (2 quarter units=1.3 semester units) Students will enroll in the UCSF course [GRAD 202:Race and Racism in Science](#) , which discusses the historical background of systemic racism in scientific research.

GRAD 214: Ethics and the Responsible Conduct of Research (1.5 quarter units=1 semester unit). Students will enroll in the UCSF course [GRAD 214: Ethics and the Responsible Conduct of Research](#), which addresses key issues affecting the responsible conduct of scientific research.

Foundational courses (at least 12 units). A minimum of **four** “foundation” courses will be required (though students may wish to take more). These courses will be drawn primarily from courses taught in the Electrical Engineering and Computer Science and Statistics Departments and the School of Public Health at UC Berkeley and the Epidemiology and Biostatistics, Medicine, and other departments at UCSF. At least one course must be taken on each campus. To support the vision of personalized and flexible graduate education underlying the program, these courses will be selected in consultation with a faculty advisor. The majority of the classes will be at the graduate level; however, because students will enter the program with a wide range of backgrounds and training, some upper division undergraduate courses in areas in which a student has less preparation may be permitted.

Computational Sciences

Computer science

1. UCB CS182 Designing Visualizing and Understanding Deep Neural Networks, J. Canny (*Spring*, 4 units)
2. UCB EECS 227B Convex Optimization (Fall & Spring, 3 units)
3. **UCB EECS 186 Intro to Database Systems**
4. UCB CS286A Introduction to Database Systems, Franklin, Hellerstein (*Fall & Spring*, 4 units)
5. UCB CS188 Introduction to Artificial Intelligence, Anca Dragan, Kai Pin Ryan Koh, Pieter Abbeel, (*Fall and Spring*, 3 units; *Summer* 6 units)
6. UCB CS C280. Computer Vision (Spring, 3 units) [**CS280B and CC280A**]
7. UCB CS281A/STATC 241A: Statistical Learning Theory, P. Bartlett, M. Jordan, M. Wainwright (*Fall, Spring*, 3 units)

8. UCB CS 285. Deep Reinforcement Learning, Decision Making, and Control (Fall, Spring, 3 units)
9. UCB CS 288. Natural Language Processing (Fall, Spring, 3 units)
10. UCB CS289A Introduction to Machine Learning, J. Listgarten, J. Malik, M.M. Zhang (*Fall, Spring, 4 units*)
11. UCB Data144 Data Mining and Analytics, Z. A. Pardos, A. Condor (*Fall, 3 units*)
12. UCB PH244 Big Data: A Public Health Perspective, L. Lexin (*Spring, 3 units*)
13. UCB STAT154 Modern Statistical Prediction and Machine Learning, N. Karoui (*Spring, 4 units*)

Health informatics

1. UCSF CPH Principles of Health Informatics, Staff (*Fall, 3 units*) – planned
2. UCSF (TICR) EPI 231 Use of EHR for Clinical Research, M. Pletcher/A. Odisho (*Spring, 3 units*)
3. UCB Info 290 Applications of Artificial Intelligence in Healthcare, F. Nugen (*Fall, 3 units*)
4. UCSF High Performance Computing, K. Lindquist (*Winter, 2 units*) – planned
5. UCSF IMS 243 Human Centered Design, C. Lyles (*Fall, 2 units*)

Statistics/Biostatistics

1. UCB Stat 133 Concepts in Computing with Data, G. Sanchez Trujillo (*Fall & Spring, 3 units*)
2. UCB Stat 156/256 Causal Inference. (*Fall, 4 units*)
3. STAT 210A/B Theoretical Statistics (Fall & Spring,
4. UCB Stat 243 Introduction to Statistical Computing (*Fall, 4 units*)
5. UCB StatC235A/PHC240A Intro to Modern Biostatistical Theory and Practice, J Wang (*Fall & Spring, 4 units*)
6. UCB Stat 200A/B & Stat201A/B Intro to Probability and Statistical at an Advanced Level, Adhikari (*Fall, 4 units & Spring, 4 units*)
7. UCB PH241 Statistical Analysis of Categorical Data, Kang-Dufour (*Fall & Spring, 4 units*)
8. UCB PH245 Intro to Multivariate Statistics, Lahiff (*Fall, 4 units*)
9. UCB PH 242C: Longitudinal Data analysis, Hubbard (*Fall, 4 units*)
10. UCB PH252D Causal Inference, Petersen (*Spring, 4 units*)

Health sciences

Clinical medicine and decision sciences

1. UCSF BMS 225A Investigating Human Biology and Disease, S. Kogan (*Fall, 2 units*)
2. UCSF BMS 225B Investigating Human Biology and Disease, S. Villeda (*Winter, 3 units*)
3. UCSF Pharm 245.1 Systems Pharmacology, R. Savic (*Winter, 2 units*)

4. UCSF Pharm 245B.2 Systems Pharmacogenomics, S. Bandyopadhyay (*Winter*, 2 units)
5. UCSF CPH Introduction to Clinical Reasoning, I. Sim (*Winter*, 2 units) – planned
6. UCSF BPS 171 Precision & Personalized Medicine: Healthcare Frontiers, E. Burchard (*Spring*, 1 unit)

Epidemiology and implementation science

1. UCB PH250A Intro to Epidemiologic Methods I, McCoy (*Winter*, 3 units)
2. UCB PH250B Intro to Epidemiologic Methods II, Ahern or Colford (*Fall, Spring*, 4 units)
3. UCB PH235 Impact Evaluation for Health Professionals, Colford and Gertler (*Fall*, 3 units)
4. UCSF IMS 245 Intro to Implementation Science: Theory and Design, A. Cattamanchi (*Fall*, 2 units)

Health policy and health services research

1. UCB PH220 Health Policy Decision Making. Sentell (*Fall*, 3 units)

Race and Racism; Ethics

1. UCSF GRAD 202 Race and Racism in Science (*Fall*, 2 units)
2. UCSF GRAD 214 Ethics and the Responsible Conduct of Research, L. Silva (*Spring*, 1.5 units)

Additional proposed Foundational courses that build on existing courses include the following

- At UCSF, Epi 206 Medical Informatics, previously taught by CPH Augmented Graduate Group Member and UCSF Program Co-Director Ida Sim, will be redesigned as UCSF CPH Principles of Health Informatics staff, (*Fall*, 3 units) (planned)
- UCSF CPH Introduction to Clinical Reasoning, I. Sim, (*Winter*, 2 units) (planned)
- At UCSF, relevant courses currently under development by the UCSF Master's degree in Health Data Science include
 - High Performance Computing, K. Lindquist (*Winter*, 2 units) - introduction to the Wynton high-performance computing environment (see Section 1.2.2)
 - Advanced Data Visualization Methods, J. Kornak (2 units)
 - Data Science and Machine Learning Journal Club, I. Allen/G. Valdes (*Winter*, 1 unit)

5.1.2 Elective courses

Program students will select areas of specialization based on the work they will undertake as part of their dissertation. Some application areas will offer traditional coursework related to the chosen field of inquiry, however, some areas will require a more customized approach to obtain the required knowledge and skillset. In order to meet the elective specialization requirement, students will work with their Academic or Research Advisor to develop a plan that may include a

number of traditional courses and/or may include a number of Directed Study sections in which students take part in specialized MOOCs or workshops to complete the didactic portions of study, and follow this with application of the studied skills to a related problem space under the supervision of their Advisor. A number of UCSF courses require an additional fee for enrollment. These include courses in the Training in Clinical Research (TICR), Masters in Translational Medicine (MTM), and Global Health programs as marked below.

1. UCSF BioE 225 Mechanistic Modeling and Simulating of Biological Systems, C. Hunt (*Spring*, 2-4 units)
2. *UCSF (MTM) BioE 270 Translational Challenges: Diagnostics, Devices & Therapeutics, S. Roy (*Winter*, 2 units)
3. *UCSF (MTM) BioE 283 Designing Clinical Research for Industry, S. Roy (*Spring*, 2 units)
4. *UCSF (MTM) BioE 285 Health Care Finance and Economics, J. Spetz (*Fall*, 2 units)
5. UCSF BiomedImg 260 Image Processing and Analysis I, D. Tosun-Turgut (*Fall*, 2 units)
6. UCSF EPI 207 Epidemiologic Methods II, J. Chan, R. Graff (*Winter*, 3 units)
7. *UCSF (TICR) EPI 265 Epidemiologic Methods III, M. Glymour (*Spring*, 3 units)
8. *UCSF GH 202F Strategic Information in Global Health, A. Mirzazadeh, G. Rutherford (*Winter*, 2 units)
9. *UCSF BIostat 216 (TICR) Machine Learning in R for the Biomedical Sciences, J. Feng (*Winter*, 3 units)
10. *UCSF DATASCI 225 (TICR) Advanced Machine Learning for the Biomedical Sciences II, G. Valdes (*Spring*, 3 units)
11. *UCSF (TICR) EPI 218 Data Collection and Management Systems for Clinical Research, A. Beatty (*Summer*, 1 unit)
12. *UCSF (TICR) Biostat 209 Biostatistical Methods III, C. Huang (*Spring*, 3 units)
13. *UCSF (TICR) Biostat 210 Biostatistical Methods IV, D. Glidden (*Fall*, 2 units)
14. *UCSF (TICR) Biostat 215 Advanced Approaches to the Analysis of Observational Data, T. Newman, M. Kim (*Spring*, 304 units)
15. *UCSF (TICR) EPI 202 Designing Clinical Research, M. Pletcher (*Summer*, 2 units)
16. *UCSF (TICR) EPI 203 Epidemiologic Methods I, J. Martin (*Fall*, 4 units)
17. *UCSF (TICR) EPI204 Clinical Epidemiology, A. Beatty (*Fall*, 3 units)
18. *UCSF (TICR) EPI 222 Social Determinants of Health, K. Bibbins-Domingo (*Winter*, 1-2 units)
19. *UCSF EPI 213 (TICR) Cost-Effectiveness Analysis in Medicine and Public Health, J. Martin (*Winter*, 2-3 units)
20. *UCSF (TICR) EPI 268 Econometric Methods for Causal Inference, J. White (*Spring*, 2-3 units)
21. UCSF IMS 248 Community Engaged Research, S. Ackerman (*Fall*, 2 units)
22. UCSF IMS 267 Qualitative and Mixed Methods Research, S. Ackerman (*Winter*, 2 units)
23. UCSF MED 170.44 Current Issues in Medical Informatics, D. Avrin (*Fall*, 1 unit)
24. UCB CS 160 User Interface Design and Development (*Fall, Spring, Summer*, 4 units)
25. UCB CS 260A User Interface Design and Development (*Fall, Spring, Summer*, 4 units)
26. UCB CS 195 Social Implications of Computer Technology, Harvey (*Fall, Spring*, 1 unit)
27. UCB BioE 213 Fluid Mechanics of Biological Systems, Berger, Liepmann (*Spring*, 3 units)
28. UCB CS 288 Natural Language Processing, D. Klein (*Fall, Spring*, 3 units)
29. UCB IndEng 266 Network Flows & Graphs, D. Hochbaum (*Fall*, 3 units)
30. UCB PH255A Social Epidemiology, Nuru-Jeter (*Spring*, 4 units)

31. UCB PH240B/STATC245 Biostatistical Methods: Survival Analysis and Causality, M van der Laan (*Fall*, 4 units)
32. UCB EE C225E. Principles of Magnetic Resonance Imaging (Spring, 4 units)
33. UCB EECS 227AT. Optimization Models in Engineering (Fall, Spring, 4 units)
34. UCB EECS 127
35. UCB PHC240C/STATC245C Biostatistical Methods:Computational Statistics with Applications in Biology and Medicine, S Dudoit (*Fall*, 4 units)
36. UCB PH243A Targeted Learning, van der Laan (*Fall*, 4 Units)
37. UCB PH243B Targeted Learning in Practice, van der Laan (*Spring*, 2-3 Units)
38. UCB PH243D Adaptive Designs, van der Laan (*Fall*, 3 Units)
39. UCB PHW212: Foundations of Global Health, Reingold, Fong (*Fall*, 3 units)
40. UCB PH250C: Advanced Epidemiological Methods, Bradshaw (*Spring*, 3 units)
41. UCB PH252E: Advanced Topics in Causal Inference, Petersen (*Fall*, 4 units)
42. UCB PH255D: Methods in Social Epidemiology, Ahern, Hubbard (*Spring*, 2 units)
43. UCB PH258: Cancer Epidemiology, Bradshaw (*Spring*, 3 units)
44. UCB PH222A: Health Care Technology Policy, Robinson (*Spring*, 3 units)
45. UCB PH214: Eat Think Design. Sandhu, Madsen (*Spring*, 3 Units)
46. UCB MCELLBI 104 Genetics, Genomics, and Cell Biology (*Fall, Spring*, 4 units)
47. UCB MCELLBI 136 Advanced Physiology (4 units)
48. UCB STAT 215A Statistical Models: Theory and Application, Yu (*Fall*, 4 units)
49. UCB STAT 215B Statistical Models: Theory and Application, Yu (*Spring*, 4 units)
50. UCB PHW226A Health Economics, Fulton (*Fall*, 3 units)
51. UCB PH 226C Economics of Population Health, Dow (*Spring*, 3 units)
52. UCB WPH 227A Health Care Finance, MacPherson (*Spring*, 3 units)

*Additional fees for enrollment

Advanced Electives (at least 6 units). A minimum of two advanced electives will be required. Some courses are taught annually; others are topic courses that may change from year to year. The student will work with their Academic Advisor to identify specific courses. Section 2 provides a list of currently available elective courses and Appendix 10 lists their descriptions.

In addition to the program requirements, students must also complete the [Responsible Conduct of Research](#) (RCR) training course. The Office of Research Administration and Compliance (RAC) offers an RCR Curriculum through the Collaborative Institutional Training Initiative (CITI). This online course will form the basis of training in different discipline fields: Biomedical; Social and Behavioral Sciences; Humanities, Physical Sciences; and, Engineering. Students and trainees may go to <https://www.citiprogram.org/default.asp> [current URL: <https://about.citiprogram.org/>] to register for the Berkeley course.

At UCSF students are required to complete the [Responsible Conduct of Research](#) (RCR) course, which helps learners identify and address the ethical issues that inevitably arise in research.

Rotations

Students will take two 10-week research group rotations in their first year. One rotation will be on each campus. Rotations will be similar to the Lab Rotation requirement in other established PhD Programs at UCSF (e.g., BMS, BMI, PSPG) and UCB (e.g., CCB). The objective of these rotations is to expose students to a range of potential mentors, labs, and projects that may develop into a dissertation research topic, and to provide additional exposure (beyond the Cornerstone course) to the practical aspects of conducting research in computational precision health, including how to work within a multidisciplinary team. Units will be assigned based on committed hours of student effort, using a conversion of 1 unit= 3 hours of work per week. A key outcome of these rotations is for students to decide on a Research Advisor, if not already identified. Rotation requirements may be filled by prior experience or ongoing work at the discretion of the student's Academic or Research Advisor; summer research internships may qualify.

Higher Degree Committees

Qualifying Examination

Students will be evaluated for depth of knowledge in their research area, breadth of knowledge in fundamentals of computational precision health, ability to formulate a research plan, and critical thinking. Specifically, the examination will cover three areas:

- (1) fundamentals of computational science
- (2) fundamentals of health science
- (3) the student's chosen "third" area of research specialization.

The Qualifying Examination Committee will consist of four members of the Berkeley or UCSF Academic Senates: three CPH AGG core faculty members, and an Academic Senate Representative/outside member, who may be a CPH AGG affiliate, but must be a Senate member from the same home campus as the student. At least one faculty member from each campus must be included. The Chair must be a core member of the CPH AGG and have the same home campus as the student, but may not be the student's Research Advisor(s) or Dissertation (co-)Chairs. Selection of Qualifying Examination Committee members is the responsibility of the student, in consultation with their Research Advisor(s), and must be approved by the Head Graduate Advisor and the home campus Graduate Division. Students are encouraged to work with the GSAO to submit the application for committee approval.

Each student should pass an oral Qualifying Examination by the end of the fourth semester. The exam will last up to three hours. The committee will grade the examination either "Pass" (or "Contingent Pass" at UCSF, pending response to committee concerns on the proposal, or "Partial Failure" at UCB) or "Fail". Students who are judged to have failed the examination are allowed to retake the examination one time. The minimum time between examinations is three months. Failure of the second exam will constitute grounds for termination of the PhD program, and will be communicated in consultation with the home campus Graduate Division.

Dissertation

Filing your doctoral dissertation at the Graduate Division is one of the final steps leading to the award of your graduate degree. Your manuscript is a scholarly presentation of the results of the research you conducted. Your faculty committee supervises the intellectual content of your manuscript and your committee chair will guide you on the arrangement within the text and reference sections of your manuscript. Consult with your committee chair early in the preparation of your manuscript.

The Dissertation Committee will consist of at least three members of the Berkeley or UCSF Academic Senates, with at least one member from each. The student's Research Advisor (or co-Advisors) will serve as the Chair (or co-Chairs). The Chair and Academic Senate Representative must both be members of the Academic Senate and from the same home campus as the student. (Should, as envisioned, the relevant governance bodies approve joint Academic Senate membership for jointly appointed faculty, these faculty will be eligible to serve as the Chair for students with either home campus). A co-Chair, if there is one, must also be a member of the Berkeley or UCSF Senate but may be from the non-home campus. Students will have an opportunity to change their initial designation of home campus prior to their qualifying exam to ensure that their home campus matches that of their Research Advisor. At least two members of the Committee must be core members of the Augmented Graduate Group in Computational Precision Health; the third member must be outside the core CPH graduate faculty; they may be an affiliated member of the CPH AGG or a faculty member outside the CPH AGG. The Dissertation Committee will be developed by the student in consultation with his/her/their Research Advisor or co-Advisors. All dissertation projects must be scholarly, independent and original research that implements knowledge, techniques, and methods from the computational and health sciences to contribute new knowledge to the field. Students will commence work on their dissertation by the fourth semester, after advancing to candidacy. The student must meet with his or her Dissertation Committee at least once each year while in candidacy.

Dissertation defense

A dissertation defense will not be required (Plan B). However, students will be required to present their research orally on a number of occasions including in the Doctoral Seminar and during program retreats.

Special requirements

Additional requirements of the program include:

1. Attendance at retreats (½ day, biannually) which bring together current students, alumni, and core and affiliated faculty in the program for a combination of research talks, career development presentations, formal and informal mentoring sessions, and social and cohort building opportunities.
2. Initial and ongoing training in research ethics (e.g., completion of the Collaborative Institutional Training Initiative (CITI) program in Research, Ethics, and Compliance,

which meets UCSF Institutional Review Board requirements for human subjects training).

3. Initial and ongoing training in Compliance and Conflicts of Interest in Research Briefing (COIR-SF-ECO) available as an eCourse at the [UC Learning Center](#).
4. Initial and ongoing training in UCSF Foundations of Diversity, Equity and Inclusion (SFMOD0-DEI-20200119) available as an eCourse at the [UC Learning Center](#).

Designated Emphasis (DE)

Overview

The Designated Emphasis (DE) in Computational Precision Health (CPH) is jointly offered by UC Berkeley and UCSF. The Designated Emphasis is administered by each campus in parallel; students will incorporate CPH courses and advising into their PhD coursework. Students will be part of an interdisciplinary, intercampus community of UCSF and UC Berkeley scholars with diverse academic backgrounds, providing unique cross-campus opportunities.

Associated Programs and DE Admissions

Matriculated PhD students from any UC Berkeley program may be considered. Matriculated PhD students from the below listed UCSF programs may be considered:

- PhD, Joint UCSF/UC Berkeley Graduate Group in Bioengineering, UCSF Schools of Pharmacy and Medicine; UC Berkeley College of Engineering
- PhD in Biomedical Informatics, Biomedical Informatics Graduate Group, UCSF School of Pharmacy
- PhD in Epidemiology and Translational Science, Department of Epidemiology and Biostatistics, UCSF School of Medicine

Interested students should apply to the Designated Emphasis at least two semesters/three quarters before their PhD Qualifying Examination.

Applicants will be selected for admission on the basis of their academic qualifications, the appropriateness of their interests to the program's teaching resources, and the enrollment capacity of the required courses.

DE Curriculum for UCSF Students

UCSF students accepted to the DE in Computational Precision Health can find a list of qualifying courses below. Additional courses falling within the two domains below may also qualify as long as these are approved by the student's DE advisor. If a student elects to take courses in the Training in Clinical Research (TICR) or the Masters in Translational Medicine (MTM) programs (marked below for Core and Elective courses), additional fees will be required for enrollment, which will be the student's responsibility.

1. Health Science and Health Informatics

Clinical Reasoning and Personalized Medicine: diagnosis and treatment, evidence-based medicine

- EPI 204 (TICR) Clinical Epidemiology, M. Kohn/T. Newman (Fall, 3 units)
- BPS 171 Precision & Personalized Medicine: Healthcare Frontiers, E. Burchard (Spring, 1 unit)

Health Informatics: electronic health records, data interoperability

- EPI 231 (TICR) Use of EHR for Clinical Research, M. Pletcher/A. Odisho (Spring, 3 units)
- EPI 226 Informatics tools for health disparities research, W. Brown (Winter, 2 units)
- IMS 243 Human-Centered Design, C. Lyles (Fall, 2 units)

2. Computing and Statistical Sciences:

- BIOSTAT 273 Introduction to Biostatistics, D. Quigley (Fall, 1 unit)
- BIOSTAT 216 (TICR) Machine Learning in R for the Biomedical Sciences, J. Feng (Winter, 3 units)
- DATASCI 225 (TICR) Advanced Machine Learning for the Biomedical Sciences II, G. Valdes (Spring, 3 units)
- IMS 245 Introduction to Implementation Science: Theory and Design A. Cattamanchi, P. Shete (Fall, 2 units)

CPH Doctoral Seminar (CPH 270)

In addition, students will participate in at least 3 quarters of the CPH Doctoral Seminar. The seminar will consist of a combination of journal club-style discussion of recent literature in Computational Precision Health, and guest faculty speakers drawn from across the CPH Graduate Group and beyond. This seminar will be held in conjunction with UCB DE CPH students.

Elective Courses

No elective courses are required for the CPH DE program, but the DE Advisor may guide students on additional courses to supplement their training in this field. A non-exhaustive list of possible courses of interest is provided below:

- BioE 225 Mechanistic Modeling and Simulating of Biological Systems, C. Hunt (Spring, 2-4 units)
- BioE 270 (MTM) Translational Challenges: Diagnostics, Devices & Therapeutics, S. Roy (Winter, 2 units)
- BioE 283 (MTM) Designing Clinical Research for Industry, S. Roy (Spring, 2 units)
- BioE 285 (MTM) Health Care Finance and Economics, J. Spetz (Fall, 2 units)
- BiomedImg 260 Image Processing and Analysis I, D. Tosun-Turgut (Fall, 2 units)
- EPI 207 Epidemiologic Methods II, J. Chan, R. Graff (Winter, 3 units)
- GH 202F Strategic Information in Global Health, A. Mirzazadeh, G. Rutherford (Winter, 2 units)
- IMS 248 Community Engaged Research, S. Ackerman (Fall, 2 units)
- IMS 267 Qualitative and Mixed Methods Research, S. Ackerman (Winter, 2 units)
- MED 170.44 Current Issues in Medical Informatics, D. Avrin (Fall, 1 unit)
- EPI 222 (TICR) Social Determinants of Health, K. Bibbins-Domingo (Winter, 1-2 units)

DE Curriculum for UC Berkeley Students

Students admitted to the CPH DE program must complete 2 semesters of the CPH Doctoral Seminar, and at least 3 courses approved by the DE advisors in the following two domain areas: 1) Health and Public Health Sciences ; and, 2) Computing and Statistical Sciences. In order to ensure that the DE confers sufficient additional breadth beyond a student's home program, students in a primarily computational PhD program (for example, Bioengineering, Electrical Engineering and Computer Science, Computer Science, Statistics, Biostatistics, Computational Biology, Industrial Engineering and Operations Research) will be required to take at least two courses in the health domain; those in Epidemiology and Health Policy will be required to take at least two courses in the Computational Sciences domain. For those students outside of computational PhD programs, the DE Advisor will provide guidance on the appropriate balance of courses between the two domains.

Example Core Courses

Example qualifying courses are listed below. Additional courses falling within the two domains can qualify if approved by the student's DE advisor.

1. Health and Public Health Science

Clinical Reasoning and Personalized Medicine: diagnosis and treatment, evidence-based medicine

- PH250B Epidemiologic Methods II, Ahern (Spring, 4 units; offered Spring 2022)
- Foundations of Global Health, Reingold, Fong (Fall, 3 units; last offered Fall 2021)
- PH 226C Economics of Population Health, Dow (Spring, 3 units; offered Spring 2022)
- PH255D Methods in Social Epidemiology, Ahern, Hubbard (Spring, 2 units; offered Spring 2022)
- PH222A Health Care Technology Policy, Robinson (Spring, 3 units; offered Spring 2022)
- PH235 Impact Evaluation for Health Professionals, Colford and Gertler (Fall, 3 units; last offered Fall 2016)

2. Computing and Statistical Sciences

- CS289 Introduction to Machine Learning, J. Listgarten, J. Malik, M.M. Zhang (Fall and Spring, 4 units; offered Spring 2022, Fall 2021)
- Stat 156/256 Causal Inference. (Fall, 4 units; last offered Spring 2018)
- CS281A/STAT 241A Statistical Learning Theory, P. Bartlett, M. Jordan, M. Wainwright (Fall, Spring, 3 units; last offered Fall 2021)
- STAT154 Modern Statistical Prediction and Machine Learning, N. Karoui (Spring, 4 units; offered Spring 2022, Fall 2021)

We note that in some cases, for example, STAT 154 and STAT 156/256, an upper division undergraduate course may be acceptable for the DE. This is due to the desire to accommodate students from non-computational PhD programs who may not have the programming, mathematics or statistics prerequisites for corresponding graduate-level coursework.

CPH Doctoral Seminar (CPH 270)

In addition, students will participate in at least 2 semesters of the CPH Doctoral Seminar. The seminar will consist of a combination of journal club-style discussion of recent literature in Computational Precision Health, and guest faculty speakers drawn from across the CPH Graduate Group and beyond. This seminar will be held in conjunction with UCSF DE CPH students.

Elective Courses

No Elective courses are required for the Designed Emphasis, but the DE Advisor may guide students on additional courses to supplement their training in this field. A non-exhaustive list of possible courses of interest is provided below:

- CS 160 User Interface Design and Development (Fall, Spring, Summer, 4 units; offered Spring 2022)
- CS 195 Social Implications of Computer Technology, Harvey (Fall, Spring, 1 unit; offered Spring 2022, Fall 2021)
- BioE 213 Fluid Mechanics of Biological Systems, Berger, Liepmann (Spring, 3 units; last offered Spring 2019)
- CS 288 Natural Language Processing, D. Klein (Fall, Spring, 3 units; offered Spring 2022)
- IndEng 266 Network Flows & Graphs, D. Hochbaum (Fall, 3 units; last offered Fall 2021)
- PH255A Social Epidemiology, Nuru-Jeter (Spring, 4 units; offered Spring 2022)
- PH240B/STATC245 Biostatistical Methods: Survival Analysis and Causality, M van der Laan (Fall, 4 units; last offered Fall 2021)
- PHC240C/STATC245C Biostatistical Methods: Computational Statistics with Applications in Biology and Medicine, S Dudoit (Fall, 4 units; last offered Fall 2021)
- PH243A Targeted Learning, van der Laan (Fall, 4 Units; last offered Fall 2021)
- PH243B Targeted Learning in Practice, van der Laan (Spring, 2-3 Units; offered Spring 2022)
- PH243D Adaptive Designs, van der Laan (Fall, 3 Units; last offered Spring 2018)
- PH250C: Advanced Epidemiological Methods, Bradshaw (Spring, 3 units; offered Spring 2022)
- PH252E: Advanced Topics in Causal Inference, Petersen (Fall, 4 units; last offered Fall 2021)
- PH258: Cancer Epidemiology, Bradshaw (Spring, 3 units; offered Spring 2022)
- PH214: Eat Think Design. Sandhu, Madsen (Spring, 3 Units; last offered Spring 2018)
- MCELLBI 104 Genetics, Genomics, and Cell Biology (Fall, Spring, 4 units; offered Spring 2022)
- MCELLBI 136 Advanced Physiology (4 units; offered Spring 2022, Fall 2021)
- STAT 215A Statistical Models: Theory and Application, Yu (Fall, 4 units; last offered Fall 2021)
- STAT 215B Statistical Models: Theory and Application, Yu (Spring, 4 units; offered Spring 2022)
- StatC235A/PHC240A Intro to Modern Bio-statistical Theory and Practice, J Wang (Fall & Spring, 4 units; offered Spring 2022)

- PHW226A Health Economics, Fulton (Fall, 3 units; last offered Fall 2021)
- WPH 227A Health Care Finance, MacPherson (Spring, 3 units; offered Spring 2022)

Academic Support Services

Graduate Student Affairs Officer/ Program Administrator

The UCSF- UC Berkeley Graduate Student Affairs Office provides students with support services in all aspects of graduate student life. The Graduate Student Affairs Officer (GSAO), also known as the Program Administrator at UCSF, should be the first contact when students have questions about university and departmental policy, general student life, student file, concerns and anything related to academic progress.

The GSAO also advises students in matters of policy, adding and dropping courses, establishing qualifying exam and dissertation committees, advancing to candidacy and anything related to degree progress and deadlines. The Graduate Student Affairs Officer is available to meet Monday–Thursday, 7AM – 5:00 PM by appointment only. Appointments are available by emailing Bianca Victorica, biancav@berkeley.edu.

Head Graduate Advisor

The Head Graduate Advisors are responsible for overseeing and signing documents pertaining to graduate enrollment, degrees, financial aid, student/degree progress and academic standing. They are also available for consultation on any matters relating to the program and serve as ‘back-up’ when the student’s assigned Graduate Adviser is unavailable.

Faculty Mentor/Advisor

Graduate Advisers are responsible for assisting students in selecting programs of study, and acting on petitions to add or drop courses. Graduate Advisers should maintain records of their advisee and review the records of all graduate students in the program once a year and inform the Graduate Division, in writing, if a student is not making adequate progress toward a degree. Graduate Advisers are also referred to as Dissertation Chairs.

Academic Progress

Full-time Graduate Student Status

Students are required to maintain full-time student status during the academic year. Full-time status is considered enrollment in 8 quarter units (UCSF) or 12 semester units (UC Berkeley) of graduate or upper division courses each quarter / semester. Units may be formal coursework or research units. Students unable to enroll full-time may petition for part-time status by first

discussing with the Graduate Student Affairs Officer and receiving approval from the Head Graduate Advisor.

(Note: units of matriculation are discussed as "semester" units where 1 UCB semester unit ~ 1.5 quarter unit at UCSF. Adjustments and conversions will be addressed on a course-by-course basis as needed for students.)

Grade Point Average (GPA)

Graduate students are required to maintain a cumulative grade point average of 3.0 in all academic coursework and must make satisfactory progress toward their degree and maintain good academic standing.

Grades

CPH complies with Academic Senate regulations that limit credit for courses taken on an S/U basis to one-third of a student's total units (excluding courses numbered 299 and those in the 300, 400, or 600 series). Units completed in an Education Abroad Program, a UC intercampus exchange program, or course work undertaken at the institutional partner of a Berkeley joint doctoral program are included in this one-third calculation.

Incomplete Grades

Students who have three or more Incompletes are academically ineligible to hold a student academic appointment (e.g. GSI, GSR). Doctoral students are not eligible to apply for the Qualifying Examination or advancement to candidacy if they have more than two Incompletes.

Change in Grading Option

Students may petition to change from a letter grade option to Satisfactory/Unsatisfactory or from S/U to a letter grade with the approval of the Head Graduate Adviser by filling out the Changes made after the last day of instruction must be approved by the Graduate Division. If home campus is UC Berkeley, students will complete the and submit to the GSAO. To change a study list at UCSF, after the study list filing period closes, students can initiate their request online. The request will then be routed electronically to the designated approvers for your program. At the top of the Student Portal landing page, students will use the "Study List & Grades" menu to go to the study list page and use the term drop-down menu to navigate to the relevant study list

Normative Time

For the PhD in Computational Precision Health, the established normative time to degree is five years. Doctoral students are expected to pass the Qualifying Examination (QE) by the end of the 2nd year (spring semester/quarter) in the program, advance to candidacy immediately after, and file their dissertation by the end of the fifth year.

In Absentia and Filing Fee Status

In absentia status is a form of registration available to graduate students undertaking coursework or research related to their degree programs outside of California. Students registered *in absentia* are assessed full health insurance fees, and 15% of the combined University Tuition and Student Services Fees. If applicable, students are also assessed the full non-resident tuition. To apply, students at UC Berkeley should login to CalCentral, and complete the Special Enrollment Petition (SEP) located under Student Resources, and follow the instructions. Information about *in absentia* registration can be found here: <http://grad.berkeley.edu/policy/registration-and-exchange-programs-policy/>. All applications are due no later than the first day of the semester.

The Filing Fee is a [reduced fee](#), for doctoral students who have completed all requirements for the degree except for filing the dissertation. Filing Fee is available for the fall and spring semesters only and it is not a form of registration. If students wish to use University services that are supported by registration fees, they must pay those fees. Students on Filing Fee status are not eligible to receive any university funding or hold academic appointments because they are not registered. The Filing Fee may be used only once during a student's academic career.

Conferred Degree

The Computational Precision Health PhD will be jointly awarded by both UC Berkeley and UCSF. Students at UC Berkeley and UCSF will submit their dissertations via ProQuest. Please follow the instructions below under your home campus.

[Dissertation/thesis- UCSF](#)

[Dissertation/thesis- UC Berkeley](#)

Diploma and Certificate of Completion

Student's diploma will be available from the Office of the Registrar approximately 4 months after the conferral date of your degree. For more information on obtaining your diploma, visit the home campus registrar's website. Unclaimed diplomas are retained for a period of five (5) years only, after which they are destroyed. If students require evidence that you have completed your degree requirements prior to the degree being posted to your transcript, request a [Certificate of Degree Completion](#) from the Office of the Registrar at UC Berkeley.

Funding Resources

CPH Financial Support

The program will ensure that full financial support is identified for each student to pay their tuition and fees (and Nonresident Supplemental Tuition, when necessary) and an annual stipend for five years, the program's normative time to degree. Full financial support will be provided to all students who maintain [satisfactory academic progress](#). Funding support will

come primarily from endowment funds, faculty extramural funds, Graduate Student Research (GSR) and Graduate Student Instructor (GSI) appointments.

The stipend level for all PhD students will be the same regardless of the student's home campus; the stipend will be based on the higher stipend level between the two campuses, whichever provides students the greater benefit. UCSF aligns the stipend level with the basic sciences PhD programs.

Fellowships

CPH students are encouraged to create a [PIVOT Account](#). PIVOT is one of the most comprehensive databases to help you identify funding opportunities for all disciplines from federal agencies and private foundations in the US and international sources. It includes:

- funding opportunities from federal agencies, governments, private foundations, corporate sponsors, research institutions
- over 3.4 million researcher profiles to help you find potential collaborators
- information about the calls for papers by professional journal editors or conference presentation proposals issued by professional conference organizers
- awards

Students can also find fellowship opportunities on the Computational Precision Health website and the [UCBerkeley Fellowships](#) and [UCSF Fellowships](#) websites.

Graduate Student Researcher Appointments

The GSR Appointment Request System has been designed to facilitate the hiring and extension of Graduate Student Researcher (GSR) appointments. To expedite the hiring process, ensure that students will satisfy University eligibility requirements, and meet established deadlines students must complete a [GSR Appointment Request](#). All students requesting a GSR are encouraged to consult with your faculty advisor and review the [GSR instructions and hiring process](#) prior to submitting a request.

Graduate Student Instructor Appointments

Students interested in a teaching position are encouraged to create an account on Handshake. [Handshake](#) is the Career Center's primary platform that connects students at UC Berkeley with open employment positions or by visiting the [Graduate Division GSI/GSR appointment announcement page](#). GSI's/TA's are 50% appointments which is 20 hours per week. Students are not allowed to work above 50% unless an [Exception Request Petition](#) has been submitted and approved by the Head Graduate Advisor. Students must complete all hiring paperwork required by HR and CPH prior to starting work. Students are encouraged to work with the Graduate Student Affairs Officer wherever an exception is needed. If a student decides to teach, an approved Pedagogy course has to be completed prior to the start date of the teaching position.

Wages and Tax Withholding

Students who receive some or part of their funding through GSR and/or GSI appointments receive wages, which are subject to income tax withholding. The University will issue a W-2 to any student who held a payroll appointment at the end of each calendar year identifying total income received and taxes withheld. Tax withholding amounts may be adjusted by completing a W-9 form, which should be available in the office where the payroll appointment is set up.

Federal Taxes and International Students

The Internal Revenue Service (IRS), the U.S. government tax authority, has issued strict regulations regarding the taxation and reporting of payments made to non-U.S. citizens. Payments made to international students may be subject to U.S. income tax withholdings and income tax reporting to the IRS. The University reports awards made to international students to the IRS. A percentage of such fellowship stipends is withheld for federal tax, unless the student's home country has a tax treaty with the United States that exempts its citizens from withholding. State tax is withheld for international students and other nonresidents of California if they receive over \$1,000 per month or \$10,000 per calendar year. Students may call the Foreign Tax Unit of Disbursements Office at (415) 642-3002 to learn about tax treaties between the United States and their country of residence.

Travel Grants & Awards

Students presenting research at a scientific conference (in person or virtually) and are enrolled in a degree granting program, may apply for the [Graduate Division Travel Award](#) (UCSF) or the [Conference Travel Grant](#) (UC Berkeley)

Graduate Student Life & Wellness

Graduate Student Life at UC Berkeley

[The Graduate Assembly](#) is the official representative body of the graduate and professional students at UC Berkeley. CPH students are encouraged to join the [mailing list](#) as it will provide many opportunities to engage with other graduate students on campus and access a variety of resources.

[Inclusive Excellence Hub](#) at UC Berkeley is the first campus-wide community space exclusively dedicated to increasing excellence through diversity and belonging among Berkeley's graduate students.

[GradPro](#) helps graduate students to develop their skills, succeed in their programs and launch their careers. They support students in exploring and preparing for a full range of diverse

careers available within and beyond academia by offering one-on-one consultations, workshops and a variety of professional development events.

Graduate Student Life at UCSF

[The Graduate & Professional Student Association](#) is the official representative at the UCSF campus. CPH students can join the mailing list and access the resources and engage with the community of graduate students at UCSF.

Wellness & Student Health Services

The [Wellness Center](#) at UC Berkeley offers registered graduate students a variety of resources. Students are eligible for mental health and counseling and psychological services regardless of insurance coverage. The GA website has information on office locations and upcoming events. Additional resources for parents, students with disabilities and for those looking for support with taxes.

At UCSF, [Student Health and Counseling Services](#) offers students a variety of workshops, lectures, small group series and health education to improve the health and promote personal success. This unit is also responsible for UC SHIP, which covers medical, mental health, dental, vision prescription and travel insurance benefits for all UCSF registered students as well as in-clinic services.

The [Recreational Sports Facility](#) (RSF) at UC Berkeley accommodations include an Olympic-sized swimming pool, 3 weight rooms, seven basketball courts, seven racquetball/handball courts, six squash courts, treadmills, elliptical trainers, stairmasters, rowing machines, and stationary bikes. Additionally, there is space reserved for volleyball, badminton, group exercise classes, martial arts, and table tennis, personal training, and more.

UCSF's [Bakar Fitness Center at Mission Bay](#) is a unique and beautiful fitness center with three fitness floors offering State-of-the-art equipment, an outdoor rooftop pool, indoor swimming pool, a dedicated Pilates studio, squash and racquetball courts, locker rooms and saunas, NBA full-sized basketball court, Group X and F45 classes, functional training space, a climbing wall and more. The [Millberry Fitness Center at UCSF Parnassus](#) offers state-of-the-art equipment, group fitness classes, online class reservations, basketball and squash courts, locker rooms and saunas, indoor swimming pool, personal training and more.

UC Berkeley Campus Resources

[Principles of Community](#)

[Division of Equity & Inclusion](#)

[Disabled Students Program](#)

[Basic Needs/Student Pantry](#)

[UC Berkeley Library](#)

[Graduate Writing Center](#)

[Report an Incident/Resources](#)

[PATH to Care](#)

[Ombuds Office](#)

[Student Learning Center](#)

[Undocumented Student Program](#)

[Student Transportation](#)

[Gender Equity Resource Center \(GenEq\)](#)

UCSF Campus Resources

[Principles of Community](#)

[Division of Equity & Inclusion](#)

[Disabled Students Services](#)

[Office of Career and Professional Development \(OCPD\)](#)

[Basic Needs/Student Food Market/The Pantry/Housing](#)

[UCSF Library](#)

[Learning Resources Services](#)

[Ombuds Office](#)

[Student Health & Counseling](#)

[Student Transportation](#)