January 7, 2019

Robert Horwitz, PhD
Chair
UC San Diego Academic Senate
9500 Gilman Drive
La Jolla, CA 92093

Dear Academic Senate Chair Horwitz,

On behalf of the Health Sciences we submit this attached full proposal for the establishment of a School of Public Health at UC San Diego. Our vision is to incorporate a wide and novel range of expertise across the campus by fostering extensive education and research partnerships, leveraging our many existing outstanding public health-oriented faculty and programs, and capitalizing on our strengths in both traditional and state-of-the-art public health domains. We aspire to be transformative in public health education, research, innovation, and community impact.

The formation of a School of Public Health addresses three critical needs of better addressing persistent and emerging public health problems, integrating public health education and research efforts across the campus, and reducing the national and statewide shortage of public health professionals. Today’s public health challenges require a 21st century approach that is anchored in the traditional core public health competencies while expanding and integrating novel methodologies that are among UC San Diego’s greatest strengths, including: climate and oceanography, geoscience, engineering, data science, design thinking, business, and medicine.

We are pleased to present this full proposal for your consideration and look forward to your feedback. We would also be delighted to provide any additional information you may need throughout the review process.

Sincerely,

David A. Brenner, MD
Douglas Ziedonis, MD, MPH

cc: C. Anderson
    R. Kronick
    R. Ross
We are pleased to submit the attached proposal to establish an innovative, 21st century School of Public Health at UCSD. We appreciate the positive review that our pre-proposal received last year from the UCSD Representative Assembly, and the Systemwide Academic Senate, as well as the many excellent suggestions for strengthening the pre-proposal and the helpful requests for clarification. In the document below we respond to each of the concerns raised during the review of the Pre-Proposal. Here we provide an overview of the three main concerns that were raised, and our responses to those concerns.

1) **Financial viability** – Reviewers raised concerns about the financial viability of the proposed school. We have two exciting developments to report. **First, Dr. Herbert and Nicole Wertheim have committed to donating $25 million** as their initial gift in support of the SPH. Second, **the UC San Diego Chancellor and the Vice Chancellor Health Sciences have committed an additional $7M of new funds to support the SPH.** Chancellor Khosla has committed to fund five $1 million endowed chairs in the SPH ($5M), and Vice Chancellor Brenner has committed $500,000 per year for four years to fund faculty recruitment and startup costs ($2M). These resources are supplementary to the core foundation of support, which includes an anticipated 30 faculty FTEs, 29 staff FTEs, space for the approximately 100 faculty expected to have a primary appointment in the SPH, and institutional support for Human Resources, Contracts and Grants, and other functions as described below. In addition, the UCSD Development Office has formulated a comprehensive fund raising plan and is committed to aggressively implementing that plan.

We have rewritten the financial section of the proposal to reflect these developments, and included a copy of the Development Office fund raising plan in the revised proposal. We are well aware of the challenges in making the SPH a financial success. In addition to the generous lead gift from Dr. and Mrs. Wertheim, and the commitments from Chancellor Khosla and Vice Chancellor Brenner, the success of the school will be predicated on student tuition revenue meeting the projections in our financial plan, and on a continuation of indirect cost recovery generated by faculty contracts and grants. We are confident that the budget for the proposed school is based on realistic assumptions in these areas, and hope that reviewers will agree that the proposed financing for the school is adequate. The construction of a building for the School is dependent on additional donations, and additional endowment funds will accelerate growth in faculty, students, and programs. However, the facilities that are currently being used to house the faculty and academic programs that will migrate into the SPH are adequate, and will remain available to the SPH after the school is established. Further, we emphasize that with the funds committed to date, the School will be on a solid financial footing for academic and research success.

2) **Faculty commitment** – Reviewers raised concerns about whether the proposed school would have a critical mass of faculty committed to its success. We have not yet asked faculty to make a binding commitment about whether they will move their primary appointment into the SPH. It seems premature to do so given that some aspects of conditions of employment (e.g., teaching load, APU structure, return of indirect cost recovery on research grants) have not yet been finalized. However, we have asked faculty members whether they would be interested, in principle, in moving their primary appointment into the SPH. Almost all of the faculty in FMPH outside, of the clinical Family Medicine and Preventive Medicine divisions, who responded to a short survey expressed interest in moving their primary appointment into the SPH. In addition, as attested to in the letter from Dr. Davey Smith, Chief of the Division of Infectious Disease and Global Health in the Department of Medicine, he expects approximately 10-15 faculty from that Division to move their primary appointment to the SPH. Further, as letters from the Deans of the Scripps Institute of Oceanography and the School of Engineering, and chairs from a variety of departments in the SOM make clear, large numbers of faculty in those schools are enthusiastic
Our responses to each of the concerns raised by reviewers are provided below. Reviewers concerns are in italics; our responses in regular font.

From Provost Brown’s letter to Chancellor Khosla:

The proposed work, I was heartened to read, will take place in connection with the School’s commitment to diversity and inclusion. The School plans to make diversity and inclusion a “central priority” for its core functioning, devoting attention to student diversity, faculty diversity, and research on diversity. For me, it is imperative that diversity and inclusion are addressed as the campus develops its full proposal for the School of Public Health.

A central challenge in public health is reducing the large disparities in health outcomes between the advantaged and the disadvantaged. As a result, diversity and inclusion are hallmarks of public health research, education, and practice. We have added a summary paragraph on the School’s commitment to diversity and inclusion to the Executive Summary, and expanded the diversity and inclusion discussion on pages 33-34.

If approved, UC San Diego would join UC Berkeley and UCLA in having a School of Public Health. I noticed that the pre-proposal did not include letters of support from those Schools. In the full proposal, I would appreciate reading letters of support from the Schools of Public Health and UC Berkeley and UCLA as their perspectives on how UC San Diego’s School of Public Health will complement our existing public health schools are important. I would also appreciate consultation with UC Irvine and UC Merced as these campuses have proposed schools of public health in their Five-Year Planning Perspectives.

We have been in contact with our colleagues at the UC Berkeley and UCLA Schools of Public Health, and expect to have letters of support prior to submission of the full proposal to the Systemwide Senate. We include a letter of support from UCI and expect to have a letter of support from UC Merced as well.

Finally, I noticed that the School will pursue accreditation from the Council on Education for Public Health and that particular steps, such as the expansion of the Master of Public Health and the creation of additional doctoral programs, will be taken in the near future. In the full proposal, I would expect to see a timeline for Council on Education for Public Health approval that includes more specific plans on academic program development over the next several years.

We provide a timeline for CEPH accreditation and more specific plans on academic program development on page 36. We plan to apply for CEPH accreditation in 2023. In addition to our current
program offerings, CEPH requires that we develop a third concentration in the MPH, and an additional doctoral program. The MPH is currently offering concentrations in Epidemiology and Health Behavior, and is submitting a proposal in October 2018 for a General Public Health Concentration targeting medical trainees. Working groups of faculty, primarily from FMPH, but also including faculty from Psychiatry, Engineering, the Design Lab, and SIO are developing proposals for additional concentrations, focusing on mental health, public health ethics, climate and health, environmental health, and data science. We plan on offering a third concentration by 2019 and two additional concentrations by fall 2021. We are working on development of a proposal for an additional Ph.D. We are well positioned to start doctoral programs because of the breadth and depth of research faculty who have expressed strong interest in affiliations with the new SPH. Each of the thematic areas identified as important to the school in this proposal have the potential to be turned into strong doctoral programs. The development of MPH concentrations in areas such as climate and health, data science, engineering and public health, population health, and mental health and public health, will lay the groundwork for possible doctoral programs in these areas. We expect that the additional doctoral program will be a small program that leverages much of the existing curriculum in the Public Health doctoral program as well as in the SIO, Bioengineering, and across campus. The program will receive the standard block grant, and students will be supported by TAships and GSR/research funding with the potential for a T32 training grant. Our goal is to submit a proposal for the new doctoral program by Spring, 2020, with the first students enrolling in the Fall of 2022. That timeline would allow us to submit our School of Public Health application for accreditation by Fall 2023, which is five years after the matriculation of our first MPH students, and the earliest date that CEPH will allow an application.

From the Coordinating Committee on Graduate Affairs (CCGA)

First, the full proposal should give detailed assurances and commitments from the faculty and administration about the faculty FTE transfers and joint/split appointments as these will be consequential for the rigor of the programs in the new SPH.

As discussed above, we expect that approximately 100 faculty will choose to move their primary appointment into the SPH, including 30 FTEs held by faculty in FMPH. Additional FTE faculty from the Division of Global Health in the Department of Medicine are also expected to move to the SPH. The Vice Chancellor of Health Sciences has committed that when a faculty member in the SPH holding an FTE or a partial FTE leaves UCSD that the FTE will remain in the SPH. This commitment is in contrast to the status quo in the School of Medicine (SOM) – when a faculty member holding an FTE in the SOM leaves UCSD, the FTE reverts from the Department to the Dean of SOM. The department of the departing faculty member typically has a strong presumption that the FTE will return to the department, but this is not guaranteed. In contrast, FTEs and partial FTEs in the SPH will ‘belong’ to the SPH.

Second, the full proposal should also address how the new SPH’s ability will achieve critical mass in its academic programs given its anticipated small size of its MPH program, the core degree and pipeline program required of any SPH (there are challenges faced by modest sized public health programs that should be anticipated and addressed; lessons from UC Berkeley should be helpful here, for example).

Applications to the newly established MPH and Biostatistics Ph.D. program have been much stronger than expected, and we have modestly increased the projected number of steady state students per cohort in the MPH program from 50 to 65, and increased the projected ramp-up (but not the steady state enrollment) in the newly approved Biostatistics MS program (e.g., from 12 students in Year 1 to 15 students in Year 1). Under these updated projections, we are expecting approximately 250 graduate students and 600 undergraduate majors in the School by 2021. We currently have approximately 600 undergraduate Public Health majors, studying for their BSc degree. We recognize that we propose a relatively small number of graduate students for a school, but emphasize that the financial model for the
MPH program, which has been thoroughly reviewed both by the UCSD and Systemwide Academic Senates and the UCSD CFO and Campus Budget Office, is a sound one.

The core faculty who have expressed strong interest in moving their appointment into the SPH, along with the large number of faculty throughout UCSD who have expressed interest in joint or secondary appointments gives us confidence that the School will have a critical mass of faculty. Unlike many proposals for new schools, our proposal is built on a strong foundation of existing public health faculty and academic programs. Many of these proposals start with a small number of faculty and students, and require substantial new resources to reach critical mass. In contrast, we expect our SPH to start with approximately 100 faculty whose primary appointment is in the SPH, and, within two years, approximately 250 graduate students. We expect that formation of the School will increase philanthropy as well as accelerate both educational and research collaborations with the Schools of Engineering, SIO, and faculty and students from other many other units on campus with public health interests. Further, both the MPH and the MS in Biostatistics can potentially expand as and when justified by demand.

Third, how will the new SPH help prevent future fragmentation of public health programs that might originate elsewhere at UCSD especially given the global health programs that will remain outside the SPH?

The broad range of participating faculty that reflects the full diversity of UC San Diego’s faculty is one of the unique features and major strengths of the proposed SPH. While administrative leadership and curriculum development will be centered within the Office of the Dean of the SPH, we anticipate that SPH students will engage faculty throughout the campus in pursuit of our multidisciplinary mission. We view participating faculty in other Schools as one of our major strengths rather than as risks for fragmentation.

Fourth, the proposal should address the lack of a joint MPH degree program with SDSU is in contrast to the existing UCSD/SDSU joint doctoral program in public health.

We appreciate the encouragement to continue our strong partnership with SDSU with our Joint Doctoral Program, and we are committed to doing so. SDSU has provided a strong letter of support for the proposed SPH. Our many ongoing collaborations with SDSU include the Joint Doctoral Program in Public Health, and many research and programmatic collaborations among faculty. We expect to maintain the vibrant and constructive relationship if the proposed SPH is approved. To be a CEPH-accredited School of Public Health we are required to have an independent MPH program. We have established an MPH program that is independent of SDSU, and matriculated the first 21 students in Fall, 2018, and are confident that program will be successful. Both UCSD and SDSU leadership are aware of this requirement and supportive of the independent MPH program. We are confident that the San Diego metropolitan area can support both universities’ MPH programs, particularly since the programs differ in orientation. We note that a number of cities, such as Boston, Atlanta, Los Angeles and New York support more than one MPH program.

Finally, specific details should be given on how to integrate admissions, courses, advising, transfer and other requirements across the various degree programs that will move to create synergy and coherence, if necessary.

As now described in the proposal on page 36, faculty and staff in FMPH engage in substantial coordination among the various degree programs that will be in the SPH. This coordination is focused on creating synergies among the programs, and assuring coherence in the educational offerings. Examples of the activities and projects in this work:
• Coordinators and student advisers for the various educational programs sit in the same space, to facilitate cooperation.
• The educational program coordinators meet regularly to facilitate sharing of knowledge, best practices, and develop synergistic strategies. Further, they cross-cover for each other across programs. An example of integration already in place is the close coordination between programs in that both PhD programs provide TAs for the BSPH and MPH and it is expected that some MPH students may also TA in the BSPH.
• We have created an integrated website https://ph.ucsd.edu/ where all public health programs will be featured.
• We are creating a dynamic database linking student, faculty, alumni, and program-specific data, to help directors, coordinators and school leadership with accreditation efforts and planning. A prototype of the database has been created, and we're in the process of creating the full version using Tableau as a platform.
• All FMPH education program directors meet annually as part of an Education Leaders retreat (this includes public health programs and residency programs).
• Best practices and rubrics for JDP admissions meetings were shared with the MPH admissions committee and the MPH committee adapted those materials when developing the MPH-specific admission rubrics.
• The public health program directors meet monthly as part of the FMPH Education Committee. One of the agenda items for this group has been consideration of which JDP classes might be open to MPH students (and vice versa), and similarly, consideration of crossover classes for the LHCO and Biostatistics programs. Some JDP students have already taken some PhD Biostatistics courses, and we expect additional synergies across programs as the Biostatistics MS program is initiated, the MPH program grows, and the LHCO program is more closely integrated with other programs in the new SPH. Further, the Vice Chair for Education has convened instructor-level meetings to ensure that the curriculum is appropriate at various levels (for example, assuring that the Biostatistics course in the MPH builds on the Biostatistics course in the BSPH).

Many of the educational programs that will be housed in the proposed SPH are relatively new – the MPH accepted matriculated its first students in Fall, 2018, the third cohort of Ph.D. students in Biostatistics entered in Fall, 2018, and the MS in Biostatistics, if approved at the November, 2018 meeting of the CCGA, will matriculate its first class in Fall, 2019. As these programs grow and mature, we will work at assuring coherence and synergy.

The full proposal should describe how it will attain the scale needed to address these needs. For example, how will the small MPH student pipeline be leveraged to address these needs?

Please see our response above.

How will the new SPH differentiate itself from the SPHs at UCLA and UC Berkeley to be competitive and truly complementary in terms of degree programs offered? The pre-proposal already mentions several specialization and priority areas that could help set it apart; the full proposal should go into the specifics of how these will be realized and with what resources. The full proposal should also obtain letters of support from the SPHs at UCLA and UC Berkeley.

The UC system is fortunate to have outstanding SPHs at UCLA and UC Berkeley. The proposed UCSD SPH will capitalize on our world class strengths in climate change; our partnerships with engineering in areas such as data science, mobile and sensor engineering, and bioengineering; our ongoing work in border health issues, facilitated by proximity; our commitment to integrating mental health into population health, and population health work facilitated by our close connection with the clinical health
enterprise. As mentioned in the letter from Al Pisano, Dean of the Jacobs School of Engineering, faculty in the JSOE and SPH have begun exploring the development of a variety of joint degree programs, including a potential Master’s program in Global Health Technology and Practice. Similarly, we will explore prospects for a joint Master’s program with SIO in Climate and Public Health. As noted in the letter from Margaret Leinen, Dean of SIO, two faculty members have been jointly recruited by SIO and Health Sciences. Further, SIO and Health Sciences have proposed recruiting an additional two faculty members.

As a beginning step, faculty in FMPh are already working with colleagues at SIO, the School of Engineering, and the Department of Psychiatry on developing additional concentrations in the MPH program. Potential additional concentrations include climate and public health, engineering and public health, mental health and public health, and population health/bioinformatics. These potential concentrations are still works in progress, but courses in them would likely largely consist of courses already being offered; to the extent that new courses are required, resources would come from tuition revenue from the MPH program.

As discussed above, we are in discussions with colleagues at the UCLA and UC Berkeley Schools of Public Health, and expect to have letters of support from those schools prior to submission of the full proposal for Systemwide review.

University Committee on Planning and Budget

We hope the final proposal will address the extent to which the development office will make the SPH a fundraising priority, and the extent to which the SPH will be able to draw on additional resources and revenue generation possibilities.

As described in the Development Plan included in the full proposal, the Development Office at UCSD is committed to making fundraising for the SPH a priority. The Development Plan is centered around securing a lead donor for the capital campaign to fund construction of a building for the SPH, as well as securing donors for additional endowments (beyond the Wertheim lead gift) to support growth in SPH operations, faculty, and students. The Development Office has already identified 91 prospects with giving capacity, 11 of whom have giving capacity of more than $1 million.

UCSD recognizes the considerable positive impact the Wertheim gift and prospective UC approval for the SPH will have on attracting future philanthropy. Importantly, the Wertheims are personally committed to vigorously seeking other donors to support the SPH, and have made this express commitment in the gift agreement. Dr. Wertheim has already demonstrated his ability to encourage other philanthropists to give towards the schools for which he gave the founding gift. He has done this for the University of Florida (UF) Herbert Wertheim College of Engineering, the Herbert Wertheim College of Medicine at Florida International University, and the Nicole Wertheim College of Nursing and Health Sciences at Florida International University. After providing the naming gift for the UF College of Engineering, Dr. Wertheim actively participated in the philanthropic plan by attracting other donors towards an additional $250M of funding. Specific to the beginnings of Dr. Wertheim’s advocacy for the UCSD SPH, he has shared the goal of the UC San Diego School of Public Health with other philanthropists. Dr. and Mrs. Wertheim are members of the Giving Pledge and have discussed supporting UCSD SPH directly with other members of Giving Pledge. In another example, Dr. Wertheim informed fellow members of the advisory board of another (non-educational) organization of his goal to give a founding gift for a UCSD SPH and made clear that he would exhort them to contribute. The Wertheim’s advocacy and efforts pursuing additional donors will be of great value, including in attracting donors who live outside San Diego and California. These efforts may benefit areas of our campus beyond the SPH, and could potentially benefit other campuses in the UC system.
In addition to philanthropy, the SPH will have other opportunities for revenue generation. Both the MPH and the MS in Biostatistics are projected to generate revenue for the SPH. Further, we expect that indirect cost recovery will increase as the faculty expands. The commitments from Chancellor Khosla to fund five $1 million endowed chairs in the SPH, and from Vice Chancellor Brenner to provide $500,000 per year for four years to fund faculty recruitment and startup costs will be instrumental in these efforts.

In addition, we believe it is important for the UCSD SPH to receive the support of other UC Schools of Public Health and to coordinate philanthropic efforts with them. UCPB hopes to see letters of support from internal UCSD departments as well as other UC campuses in the final proposal. This appears to be a growing area of interest across the UC system, yet it remains likely that there is a finite capacity for such units. Can we coordinate and balance interests of individual campuses in this area to minimize competition, and maximize benefits for the system and the State?

The SPH proposal has extremely strong support throughout the UCSD campus. The proposal now includes strong letters of support from the School of Engineering, Scripps Institute of Oceanography, the Departments of Medicine, Pediatrics, and Psychiatry, the Division of Infectious Disease within the Department of Medicine, and faculty in the Departments of Economics.

We are in conversations with colleagues at the UCLA and UC Berkeley Schools of Public Health as well as other UC campuses that are considering establishing a school of public health. We have shared our pre-proposal with our UC colleagues, and have had productive conversations about how we can collaborate and how we can be differentiated from them. UCLA and UC Berkeley are in the midst of leadership transitions and are being led by Interim Deans. Those leadership transitions have complicated the job of obtaining letters of support, but we are optimistic that we will have those letters by the time the UCSD Senate has completed its review and the full proposal is sent to Oakland for Systemwide review. There is strong demand from students for public health degrees – for example, UC Berkeley reports that it accepts approximately one-third of applicants to its MPH program, and turns away many qualified applicants.

We have been in conversation with colleagues at UC Merced and UC Irvine regarding their planning efforts for schools of public health, have a strong letter of support from UCI, and expect to have a letter of support from UC Merced as well. The emphasis in our proposed SPH on integration of a traditional public health curriculum with engineering and climate science, as well as our emphasis on border health issues clearly differentiates our proposed school from the planning efforts at UCI and UC Merced.

Finally, the committee was somewhat concerned about the feasibility of the target opening date of 2019-20, as we are just receiving a pre-proposal now. It would be helpful for the final proposal to include a clear rationale for the accelerated timeline.

If establishment of the SPH required the hiring of many new faculty members, or the immediate establishment of new academic programs, we would share the reviewers’ concern about an accelerated timeline. However, we emphasize that the building blocks for the proposed school are already in place – a large group of core faculty from FMPH and from the Division of Infectious Disease and Global Health in the Dept. of Medicine are excited about the prospects of moving their appointments into the SPH, and the major academic programs that will be housed in the SPH already exist, namely the BSPH, MPH, MAS LHCO, Public Health PhD, and Biostatistics PhD. Establishment of the SPH will accelerate our fundraising capabilities, accelerate our collaborative research and educational efforts with Engineering, SIO, and other units on campus, and contribute to an increased focus of public health activities on campus, attract more faculty candidates, and increase national and international interest in our degree
programs. If the SPH is approved, we will conduct a public-facing event to celebrate the opening of the school. It seems feasible to hold that event in the fall of 2019 if the SPH is approved by July, 2019.

To evaluate the plan’s overall strength, it will be helpful to document what costs are covered outside the School’s plan or at a higher level (such as support for faculty start-up costs and facilities maintenance), what broader resource generation infrastructure is available (such as support for large grants and contracts development in this area), and what growth opportunities can be pursued (such as philanthropy and grants and contracts growth).

The SPH will continue to utilize and leverage the existing VCHS and campus support units currently used by FMH and our degree programs (just as is done by the rest of SOM and School of Pharmacy). This includes the VCHS shared service cores for academic resources for our faculty (ARC) and staff (HHR) HR, IT, and grants management core (RSC), visa processing, Grad Division/Admissions, registrar, financial aid office, classroom scheduling, both HS and campus grants submissions offices (HSSPPO, OCGA), and Office of Post Award Financial Services. Further, utilization of institutionally supported infrastructure such as facilities maintenance, renovation and construction project management, engineering and design, security, custodial and grounds services will continue. The HS shared services are a direct cost and are already in the budget as they are current expenses. The other general support offices and services are not a direct cost to departments or schools and are provided by HS and the campus.

In addition to these institutional services and recourses, both UCSD and Health Sciences have developed programs in support of large or complex grants such as center grants, program projects, and T32s and other training grants. One example includes the Health Sciences Training Grant core that has developed and provides centralized expertise in the complexities of T32s and similar training grants that have considerable and diverse components that have often been a barrier to those without experience. Another resource is the Center Launch Program provided by the Vice Chancellor for Research and Office of Research Affairs which provides seed funding for planning and development activities leading to the submission of proposals for major extramural research support making three $25K and three $75K awards per year. By using this institutional infrastructure, we will minimize our administrative expenses to maximize our investment in public health programs and faculty.

Some questions remain about funding models for start-up costs necessary to recruit new faculty, and the level of philanthropy that would be required to achieve the School’s more ambitious goals (e.g., a new building).

As discussed above, the $2 million commitment from the Vice Chancellor for Health Sciences to provide $500,000 per year for four years to fund faculty recruitment and start-up costs provides confidence that the SPH will have the resources to actively recruit high quality faculty in the early years after the School opens. These recruitment and start-up funds will be especially useful when combined with the Chancellor’s commitment of 5 endowments of $1M each. The MPH and Biostatistics both have additional faculty recruitments budgeted and planned over the first three years of the SPH. After the first four years, the SPH will have a variety of opportunities to generate additional funds for recruitment, including the growth of the Wertheim endowment, additional philanthropy, revenue growth generated by the Masters programs in the SPH, and increased recovery of indirect costs generated by new faculty members. As discussed in the Development Plan, identification of a lead donor for a building to house the SPH will be a high priority for the Development Office. In the meantime, the public health program and the proposed SPH will be continue to be housed within the SOM facilities.

Because not all opportunities can be pursued at once, particularly with what appears to be relatively lean School support staffing, it would be valuable to get more specificity into plans for collaboration with
other UCSD units. The pre-proposal affirms that there is strong support for the School of Public Health from the campus-level administration. However, it does not address fit with an overall academic and strategic plan for UCSD. UCPB would hope to see clearer articulation of campus-level planning in a final proposal.

Plans for collaboration with other UCSD units are discussed above. The Chancellor’s strategic plan for UCSD emphasizes growth in graduate students, and support for interdisciplinary research and educational programs. The proposed SPH dovetails nicely with these priorities. The SPH and SIO will be uniquely positioned to study environmental health, especially the effects of climate change on health issues in coastal areas and beyond. The JSOE proposes to partner with the SPH in order to apply engineering principles and data science to population health. The Health Sciences SOM and SSPPS may the most straightforward alignments of their strategic plans with the SPH. The SPH will become the platform by which the other Health Science schools study population health, in particular how UC San Diego Health can provide effective health care to the community, including care for vulnerable populations and correcting health care disparities. The aim is that UC San Diego Health with its outreach into the community will become a living laboratory for the SPH to study health care delivery systems.

University Committee on Educational Policy

The first suggestion pertains to the First Option Financial Plan which utilizes current faculty and resources and does not request any additional funds. The pre-proposal indicates that, because the necessary resources are in place, the impact on existing programs and overall cost would be minimal. However, the question of how resources would be shifted around, not just co-opted for the new program, should be addressed in greater detail.

As a result of the $25M lead gift from Dr. Herbert and Nicole Wertheim, we have deleted the First Option Financial Plan from the proposal.

The second suggestion is related to the admissions requirements for the new School. Based on the preproposal, it can be inferred that the new School of Public Health will subsume many existing programs and thus admissions standards that are already in place would simply be inherited by the new program. However, this should be more precisely delineated, and a plan for developing some unified admissions criteria should be in place given the likelihood that there are substantial differences between the existing admissions processes for the programs that will eventually join the School.

As discussed above, educational coordinators and program directors of the educational programs that will be housed in the SPH meet regularly and work to increase coherence among and synergy across the programs. They have developed guiding principles rigor, diversity, and inclusiveness in admissions. However, they are not working on developing unified admissions criteria, as it is not possible to unify criteria across the undergraduate, masters, and Ph.D. programs. Even across the various masters programs the skills and experiences vary significantly – for example, students matriculating in the MS in Biostatistics program will need a stronger background in mathematics and statistics than those matriculating in the MPH program, and students in the LHCO program are required to have experience working in a health care organization, which is not a requirement for the other two masters programs.
PROPOSAL TO ESTABLISH A

SCHOOL OF PUBLIC HEALTH

AT THE UNIVERSITY OF CALIFORNIA,

SAN DIEGO

Version History:
Initial Submission to UC San Diego Academic Senate on 10/13/2017
Updated Version Submitted to UCOP on 04/23/18
Revised Version Submitted to UC San Diego Academic Senate on 10/22/2018

The San Diego Divisional Senate has approved the pre-proposal (following review by Divisional Senate standing committees and Senate Council, the Representative Assembly approved it on February 6, 2018).

The April 23, 2018 version incorporated the Divisional Senate feedback. On July 25, 2018, the UC Academic Senate supported further development of the proposal. This version responds to the feedback provided by the Academic Senate.

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### Executive Council for Proposed UC San Diego School of Public Health

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In addition, an outstanding advisory group of more than 50 faculty members and administrators provided extensive feedback and input, including many from the UC San Diego School of Medicine (Departments of Family Medicine and Public Health, Medicine, Psychiatry), Departments of Anthropology and Economics; the Design Lab; Scripps Institution of Oceanography; the Skaggs School of Pharmacy and Pharmaceutical Sciences; Engineering, the Rady School of Management and the Center on Global Justice. Please see Appendix A for a list of contributors.
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EXECUTIVE SUMMARY

UC San Diego (UCSD) proposes to establish a School of Public Health (SPH) based in Health Sciences that aspires to be transformative in public health education, research, innovation, and community impact. Our vision is to incorporate a comprehensive and novel range of expertise across the UCSD campus by fostering extensive education and research partnerships, leveraging our many existing outstanding traditional public health oriented faculty and programs, and better engaging our world-class strengths in non-traditional state-of-the-art public health domains. The critical components of our SPH include business concepts for sustaining public health initiatives, innovative technologies (person, home, and community based), and perspectives of environmental science (climate change, etc.), engineering (bioengineering, nanoengineering, mechanical engineering, electrical and computer engineering, information technology and data sciences), social science (particularly economics, anthropology, political science, public policy, communication, psychology, and cognitive sciences), and the humanities (arts, ethics, history, etc.). A School is needed to provide a central point for connection and fostering collaboration within our community and non-UCSD partners. Situated within Health Sciences, the SPH would more directly bridge the continuum of our biomedical, clinical, population health, social science, and engineering expertise with public health.

At UCSD, collaboration across disciplines has generated new ways of framing problems and solving them, as well as having enhanced innovation and entrepreneurship. We envision UCSD’s SPH to be anchored in the traditional core competencies of public health (i.e., biostatistics, epidemiology, health policy, environmental health sciences, social and behavioral sciences), and to leverage advances across the campus in the life sciences, genomics, oceanography and geoscience, as well as in engineering design, informatics and data science. These areas of strengths on our campus are domains that grew to maturity well after the founding era of the current leading schools of public health. Our vision is to build these domains into the core of the school and to create a new approach to public health education, research, and practice, embedded in a vibrant technology science base. Combining these domains with the open and interdisciplinary engagement typical of UCSD (e.g. The Qualcomm Institute (QI) with 600 faculty, the Jacobs School of Engineering (JSOE), the Institute of Engineering in Medicine, the School of Medicine Departments, and the Scripps Institution of Oceanography) will create a modern and unique SPH at UCSD. A well-prepared workforce must engage with, critically evaluate, and apply these wide ranging approaches to solve current and future public health problems, while at the same time advancing its science.

There is a need for a SPH to produce synergy among the currently disparate public health activities. The proposed SPH would be transformative for UCSD and increase visibility, grant funding, and public health philanthropy while amplifying the reach of existing, siloed educational programs across our campus and promote interdisciplinary synergy of public health efforts, enhance recruitment of faculty and students, and support UCSD to be recognized as a world-class hub for public health training and research. A SPH would improve educational opportunities for students to work along the border and in communities that need public health services. It would also strengthen links between clinical medicine and public health.

Our proposed interdisciplinary SPH will be well positioned to address the evolving public health challenges and community needs in San Diego County and beyond, including those presented by our proximity to the border with Mexico which creates a tremendous opportunity for a SPH that will also be complementary with other UC SPHs. The UCSD SPH will leverage our well-established connections with the military and veteran community (the San Diego Veterans Affairs Healthcare System is adjacent to our academic campus and the Navy’s Public Health and Population Health programs are located close to our Hillcrest campus) to engage our students, faculty, and graduates. The California Health Workforce Development Council and other groups have identified a critical need for training more public health professionals. The SPH will expand the workforce and its qualifications, and equip it to work on traditional public health problems in infectious and non-infectious (chronic) diseases, as well as emerging issues such as climate change, population health, antimicrobial resistance, environmental pollutants, food scarcity, and gender equity. Further, the SPH will allow our students to develop, implement, and evaluate programs that enhance wellness and resilience for
healthy aging and address issues related to chronic diseases, obesity, mental illness, and addictions. We will align with the Centers for Disease Control (CDC) recommendation to include training in collaborative leadership, business processes, and marketing and communication (2013). Moreover, as is particularly important for a 21st century SPH with a focus on technology, we will also provide educational opportunities in public health ethics, history, and the societal impacts of emerging public health challenges and interventions. Engaging these perspectives through disruptive innovation fueled by team science, engineering technology advances, and interdisciplinary efforts, the new SPH will foster creativity in education and research, and advance community-based public health.

We are at the cusp of a revolution in healthcare technology and practice in which the focus shifts from highly invasive and acute interventions by highly trained caregivers in hospitals, to noninvasive and continuous monitoring and preventive care by everyone, anytime, and anywhere. UCSD’s SPH is ideally positioned for leadership in the development of these technologies through its programs in bioengineering, systems biology, wearable sensors, robotics, home health care without demand for office visits, assistance for the aged, bioinformatics, and revolutionary data collection and information processing sciences. More broadly, this coming revolution also includes public health interventions unlike any seen before, such as the use of genetically engineered insects to eradicate vector-borne disease or massive health promotion campaigns delivered to millions via social media. Such advances will lead to entrepreneurial activities in creating new companies and jobs in Southern California. UCSD has an outstanding track record of developing over 360 new startup companies with the private sector which will be a high priority for the UCSD SPH, including our considering requiring core trainings in innovation and entrepreneurship for students.

Administrative leaders, faculty, and students have expressed substantial interest and support for the proposed SPH. UC San Diego Chancellor Khosla strongly backs the development of an SPH, and has provided influential leadership in the creation of the Bachelor of Science in Public Health (BSPH) and the recently approved Master of Public Health (MPH) program, as well as making a significant financial commitment to the SPH (see below for details). Vice Chancellor of Health Sciences David Brenner has also provided crucial leadership and support and has also made a significant financial commitment (see below for details). Public health faculty in the Department of Family Medicine and Public Health (FMPH) have been polled asking about their intentions, and virtually all faculty who responded expressed interest in moving their primary appointment into the SPH. As attested to in the letter from Dr. Davey Smith, Chief of the Division of Infections Disease and Global Public Health in the Department of Medicine, 10-15 faculty from that division are expected to move their primary appointment into the SPH. As discussed in the letters from Margaret Leinen, Director of the Scripps Institute of Oceanography and Vice Chancellor for Marine Sciences, and Al Pisano, Dean of the Jacobs School of Engineering, there is substantial interest from their faculties in both research and educational collaborations with the SPH.

The San Diego Divisional Senate has approved the pre-proposal (following review by Divisional Senate standing committees and Senate Council, Representative Assembly approved it on February 6, 2018), and the University of California Academic Senate favorably reviewed the pre-proposal and on July 25, 2018 invited submission of a full proposal. Our proposal also has the support of many Vice Chancellors and Deans who have encouraged collaboration and partnerships in the development of this plan for the SPH, including in their own strategic planning. Their representatives from across the campus have served diligently on our SPH proposal Executive Council and Advisory Group. Health Sciences and other UCSD Divisions / Schools have added a new SPH in their aspirational goals. Hundreds of UCSD faculty with expertise and interests in public health have been engaged in developing this proposal and have expressed interest to affiliate with the SPH, including faculty in Health Sciences (including Family Medicine and Public Health, Medicine, Pediatrics, Reproductive Medicine, and Psychiatry), Education, Anthropology, Economics, Social Sciences, Philosophy, History, Biology, Engineering, School of Global Policy and Strategy, and the Scripps Institution of Oceanography (SIO). Importantly, other broadly subscribed UCSD Institutes (e.g., QI, Engineering in Medicine, Institute for Practical Ethics, and Tata Institute for Genetics and Society) and Centers (e.g., Healthy Aging, Moores Cancer Center, Center on Gender Equity and Health, Center of Tobacco Control,
Women’s Health, etc.) demonstrate how our campus can successfully administer collaborative organizations that benefit all the faculty, researchers, students, staff and community. We are sensitive to considering how a School of Public Health would impact other UCSD campus programs and have met with UCSD’s Executive Vice Chancellor of Academic Affairs (EVC), the Dean of the Graduate Division, Vice Chancellors, Deans, Chairs and Division leaders to discuss ways to maintain optimal partnerships with further enhancements. Appendix H includes strong letters of support from the Director of the SIO, the Dean of the Jacobs School of Engineering, as well as from the Chairs of the Departments of Medicine and Pediatrics.

The SPH will support interdisciplinary public health education not only for students directly enrolled in the SPH, but also for students in medicine, pharmacy, business, engineering, oceanography, public policy, international relations, economics, social sciences and humanities, urban planning, and other joint degree programs or public health courses. Addressing public health problems in the future will require creative, entrepreneurial, and ethically aware and civic-minded professionals who take both an individual and population perspective as they run hospitals, design modes of transport, apply best practices in engineering and design, and create policy. We anticipate offering cross-discipline training in MD-MPH, MPH-MBA, PharmD-MPH, engineering MS-MPH and/or PhD, and other joint programs.

The proposed SPH will be committed to diversity in students, faculty, and research. Students and faculty who will transition into the school demonstrate this commitment: 25% of the students in the undergraduate Bachelor of Science in Public Health (BSPH) are Latino, and 5% are African-American, compared to 16% and 2% among undergraduates overall. Among the Public Health faculty in the Department of Family Medicine and Public Health, 18% are members of underrepresented minorities; as are 35% of the faculty in the global public health group in the Department of Medicine. These statistics compare to 7% among UCSD faculty overall. A central challenge in public health is reducing the large disparities in health outcomes between the advantaged and the disadvantaged – in the United States men in the top 1% of the income distribution live 15 years longer than men in the bottom 1%1. The effects of climate change will almost certainly exacerbate disparities, both within the US and globally. Innovative new technologies have the potential to further exacerbate disparities, as the rich often benefit from these technologies much more than the poor. The SPH will catalyze interdisciplinary work on reducing disparities, in which traditional public health faculty conduct research with colleagues in climate science, engineering, and the social sciences focused on how to improve the public’s health. Inevitably, this work focuses on improving health outcomes for the disadvantaged. Focusing on these issues, the FMPH Department has a research center of excellence in Health Promotion and Equality. This central challenge faced in public health creates an environment in which diversity in students, faculty, and research is supported and encouraged.

Resources:

As described in the Financial Plan, the bulk of the resources for the SPH are existing resources that support the faculty and academic programs that will migrate into the SPH. However, these resources will be supplemented in two significant ways. First, Dr. Herbert and Nicole Wertheim have committed to donating $25 million as their initial gift in support of the SPH. Second, the UC San Diego Chancellor and the Vice Chancellor Health Sciences have committed an additional $7M of new funds to support the SPH. Chancellor Khosla has committed to fund five $1 million endowed chairs in the SPH ($5M), and Vice Chancellor Brenner has committed $500,000 per year for four years to fund faculty recruitment and startup costs ($2M). In addition, the UCSD Development Office has formulated a comprehensive fund raising plan and is committed to aggressively implementing that plan; the fund raising plan is included below.

These resources are supplementary to the core foundation of support, which includes an anticipated 30 faculty FTEs, 29 staff FTEs, and existing space for the approximately 100 faculty expected to have a primary appointment in the SPH. These individuals have more than $160M in research grants and contracts (total

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project periods’ direct costs; about $15.5M per year is NIH funding). Institutional support for Human Resources, Contracts and Grants, and other functions will continue, as described below.

There is a clear plan for migrating faculty without eroding the quality of existing departments. UC San Diego Health Sciences leadership and faculty have experience in developing a new school in Health Sciences from the prior experience of creating the Skaggs School of Pharmacy and Pharmaceutical Science (SSPPS) with a core faculty migrating from multiple academic units in the School of Medicine and additional faculty recruited later. Lessons learned will guide our efforts here. For instance, there will be similar processes with the establishment of the SPH, including hiring of a SPH Dean, maintaining the current SOM departments, and having faculty members elect to join the SPH as a primary appointee, or simply affiliate with the new School, as they identify what is the best fit for their own careers. Similar to the creation of the SSPPS, UC San Diego Health Sciences will support having School of Medicine resources continue in the faculty’s home department or SPH, depending on their ultimate choice.

The largest impact of the formation of the SPH will be on the current FMPH Department. Virtually all of the public health faculty in FMPH have expressed interest in moving their primary appointment to the SPH. The faculty in the Division of Family Medicine have expressed their intention to remain in the School of Medicine (although many have expressed interest in secondary appointments in the SPH), and many faculty in the Division of Preventive Medicine have not yet formed a firm opinion. Prior to a recent name change, the FMPH Department had been named the Family and Preventive Medicine (FPM) Department. It seems likely that most faculty in FMPH who choose to remain in the School of Medicine will be in a Department of Family Medicine, or perhaps a Department of Family Medicine and Preventive Medicine.

The teaching plans for the academic programs proposed for transfer to the SPH have been developed along with the teaching expectations for Senate faculty appointed in the SPH in the undergraduate and graduate programs. Much of the public health coursework has already been implemented through existing graduate level courses in the SOM, or through new courses that have been developed for our BSPH and MPH programs, including with teaching oriented FTEs.

We are well aware of the challenges in making the SPH a financial success. In addition to the generous lead gift from Dr. and Mrs. Wertheim and the commitments from Chancellor Khosla and Vice Chancellor Brenner, the success of the school will be predicated on student tuition revenue meeting the projections in our financial plan and on a continuation of indirect cost recovery generated by faculty contracts and grants. We are confident that the budget for the proposed school is based on realistic assumptions in these areas. The construction of a building for the School is dependent on additional donations, and additional endowment funds will accelerate growth in faculty, students, and programs. However, the facilities that are currently being used to house the faculty and academic programs that will migrate into the SPH are adequate and will remain available to the SPH after the school is established. Further, we emphasize that with the funds committed to date, the School will be on a solid financial footing for academic and research success.

The proposed SPH will improve UCSD’s visibility, increase grant funding, address student and faculty needs, create societal benefits, encourage philanthropy in public health, and elevate our draw of highly competitive student and faculty applicants, all of which support the investment in the school. The SPH fits well within the overall academic profile of the UCSD campus, our campus academic and strategic plans, and it will enhance existing programs while recognizing that the current programs will greatly enhance the quality and development of the new SPH.
INTRODUCTION

Rationale and Vision

As a public research university, with strength in the health sciences, we have a responsibility to protect and improve the health of individuals and communities while making new discoveries and training the next generation of public health professionals. Our vision is to establish a new UCSD School of Public Health that aspires to be transformative in public health education, research, innovation, and community impact. We will incorporate a wide and novel range of expertise across the campus by fostering extensive education and research partnerships, leveraging our many existing outstanding public health oriented faculty and programs, and capitalizing on our world-class strengths outside of traditional public health domains and through partnership with clinical medicine and laboratory sciences. The SPH will provide a central node for connection while fostering collaboration with our community and external UCSD partners.

Establishing a SPH will allow our faculty and students to better understand and address the magnitude of public health challenges locally and abroad. Current challenges include but are not limited to:

1) Improving health outcomes while reducing rapidly rising health care costs
2) Understanding the health consequences of an ever-changing climate and environment
3) Addressing the emergence of unpredictable infectious diseases (e.g. Ebola and Zika)
4) Developing community-based and population-level approaches to mental illnesses and addiction, including the opioid epidemic and tobacco use, which are leading causes of morbidity and mortality
5) Fighting the obesity epidemic and the simultaneous tragedy of food scarcity
6) Reducing rising health disparities in the U.S. and globally based on race, religion, ethnicity, class, gender and gender identity, sexual orientation, geography, immigration status, and/or disability
7) Understanding the ethical and societal implications of public health interventions that leverage emerging and ever advancing technologies (e.g. mobile technology, genetic engineering, social networking)

Establishing a School will amplify our local community engagement and partnerships, as well as global impact. Creation of the SPH will enable our faculty and students to more effectively address public health issues including homelessness, overuse of antibiotics, autoimmune diseases, poor nutrition, gender-based violence, opioid crisis, HIV, gun violence, environmental toxins, addiction, mental health, health disparities, obesity, gender identity, and the health of veterans, women and infants, refugees, and students.

Mission

The mission of the UCSD SPH will be to improve the health and well-being of individuals and communities through education, research, innovation, dissemination, and service. Grounded in core public health competencies, the SPH will engage in collaborative and interdisciplinary inquiry that leverages and critically evaluates advancing science and technologies to address acute and emerging global and public health problems. The SPH will align with UCSD’s commitment to inclusion, diversity, and equity, enhance our local and state economy, and allow our campus to respond to identified shortages in the public health workforce by training future public health leaders, scientists, and professionals from diverse backgrounds.

NEED FOR THE PROPOSED SCHOOL

Several factors serve as catalysts for proposing a new SPH at UCSD at this time. Together, these make a compelling case for the benefits that this SPH will have for our campus, the UC System, our local and regional communities, California, the nation, and globally.

Key factors supporting this proposal are:
1) UCSD’s outstanding strengths in health, engineering, technology, data sciences, and social sciences will be brought together to synergistically provide new approaches to persistent and emerging public health problems. This work will place UCSD on the forefront of public health education, scientific inquiry, and policy change.

2) Integration of public health educational and research efforts from across the campus will increase internal visibility for faculty and trainees working in public health, strengthening collaboration, expanding scientific advances, and increasing success in extramural funding. The increased visibility of an accredited SPH, rather than disjointed programs, will attract greater numbers of internationally ranked faculty and top level students.

3) UCSD’s new SPH will help address the national and statewide shortage of public health professionals, providing them with a modernized curriculum on 21st Century public health issues, and will retain excellent UCSD students and recruit others from around the globe with an interest in public health education, research, and careers.

Persistent and New Public Health Challenges in Today’s World Match Our Traditional and Non-Traditional Public Health Strengths at UC San Diego

The UC San Diego Health Sciences faculty in Public Health and in Global Public Health are focusing on the leading public health problems in San Diego County and around the world. In addition to the previously mentioned key public health issues, we acknowledge the importance of also addressing the top 10 causes of deaths and years of life lost in the U.S., which are ischemic heart disease, lung cancer, stroke, COPD, road injury, self-harm, diabetes, cirrhosis, Alzheimer’s, and colorectal cancer. The major contributors to many of these deaths (and morbidity) are underlying health behaviors of tobacco use, poor diet and physical inactivity, as well as social and gender inequities. In San Diego, the “3-4-50” concept has been created to highlight 3 behaviors (limited physical activity, poor diet, and tobacco use) that lead to 4 common diseases (cancer, heart disease and stroke, type 2 diabetes, and lung disease), which together account for more than 50% of the deaths in San Diego. We aim to produce innovative and impactful approaches to these problems, through our interdisciplinary new SPH.

Our SPH must also address not only longstanding health threats from chronic diseases, but also newer risks and problems arising from antimicrobial resistance, food scarcity, environmental pollutants, and inequities or disparities in health based on demographics (e.g., race, class, gender, sexual orientation) and environmental exposures (water contamination, soil toxicants, air pollution, extreme weather). New threats to the public’s health have arisen from communicable disease outbreaks such as Ebola, avian influenza and Zika. Preventable issues such as gender based violence contribute greatly to morbidity and mortality globally, yet still remain largely unaddressed. These and other trends will continue and change based in part on a combination of rapid development, globalization, and climate change. The proposed SPH emphasizes an interdisciplinary approach provided by the wide range of expertise available across the UCSD campus. Emerging and novel strategies to address global and public health issues will leverage advances in biotechnology, the life sciences, as well as informatics and the data sciences. UCSD faculty have longstanding involvement and local partnerships in large cohort studies that are described later (e.g. ABCD, SAGE, STARRS, Community of Mine, the Women’s Health Initiative, CARDIA, MESA, the Study of Latinos (SOL), the Diabetes Prevention Trial Observational Study, and the Study of Osteoporosis in Men, etc.) and the SPH will be able to uniquely leverage these studies. Social science will provide insights to help global, cross-border, regional and local understanding of the impacts of culture, religion, economics, gender, and other socioeconomic factors in health and health behaviors, as well as develop effective health communication and behavior change strategies across diverse populations. Attention to ethical and societal issues, as well as historical perspectives on emerging public health challenges, will come from social sciences in medicine, philosophy, history, sociology, and other disciplines. The humanities and the arts will enhance cultural understanding and engagement. Cross campus collaborations will aid in the development
and refinement of new science and new technologies that support solutions to rapidly evolving public health threats, as well as ongoing problems, and will provide individuals and communities with effective tools to promote their health and wellbeing.

In addition to the traditional core public health domains, we have identified five key 21st century public health issues that UCSD is particularly well suited to address in the proposed SPH. These are:

1) Climate Change and the Environment
2) Population Health and Disease
3) Mental Health and Addictions
4) Healthy Aging and Longevity Science
5) Women, Gender and Health

These are major and growing public health issues in the U.S., and globally, and directly correspond to multiple priorities identified within the recently ratified sustainable Development Goals for 2030. Our approach to them will be discussed in more detail in the educational and research sections of this proposal.

1) Climate change: Climate change constitutes one of the most serious emerging threats to public health worldwide. Many human diseases are linked to climate factors, exemplified by cardiovascular or respiratory illnesses that may be fatally exacerbated by extreme weather events, or altered transmission of infectious diseases. Climate change is also exacerbating existing environmental risks, and creating new ones. Furthermore, climate change will continue to drive food scarcity, mass migrations and other stressors that create major challenges to health access, infection control, and other means to promote public health. In addition, climate change impacts workplace environmental conditions and excessive workplace heat effects workers’ health and productivity. Public Health, Occupational Health, Social Science, and Economics perspectives are needed in better understanding the impacts. These topics align with many of UCSD’s Climate Change initiatives, including the Human Health and Oceans Initiative.

2) Population Health and Disease: Healthcare delivery systems are changing focus from just the care of individuals to a focus on population health. With this, there is a need for public health leadership that has an in-depth understanding of public policy, strategic planning, information management, social media, managed care, cultural competence, inter-organizational collaboration, advocacy, public health ethics, and change management. This broad training mandate requires collaboration between faculty and workers in the public health and clinical disciplines with those in the management (e.g. Rady School of Management) and technology-oriented disciplines (e.g. Jacobs School of Engineering), which are a strength at UCSD. Situating the UCSD SPH on the medical campus in Health Sciences allows for a unique SPH that will facilitate the daily interaction of clinicians and public health faculty and researchers. For example, public health education that addresses the highly connected obesity and cardiovascular disease epidemics will benefit from a broad range of clinical experts such as endocrinologists, cardiologists, behavioral psychologists, metabolic biochemists, microbiologists, pharmacologists and geneticists. This type of approach will be supported by the proposed strong, geographically co-located SPH and UCSD clinical enterprise. Laboratory buildings have been designed by astute architects to foster collaborative collisions; our SPH will be designed in a similar manner. Population Health Applied Genomics is but one example of how unique education and research collaborations unimaginined in the past will arise from close collaborations of public health and health sciences. Outstanding advancements in gene sequencing, genome based knowledge, interpretation and technology have thrust applied genomics to new and unchartered frontiers that are usually focused on personalized and precision medicine. Translation of applied genomics will have enormous impact on public health and will impact health policies, payment reforms, ethical challenges, and new research areas. Proteomics, microbiomics, epigenomics and many other -omics coupled with robust AI analysis platforms and ‘big data’ analyses will increasingly guide contemporary scientific advances. Utilizing genomics skills in a public health context will engage various stakeholders including academia, population bases, healthcare professionals, and the private enterprise and government
bodies. Besides developing an elective and competency area, applied genomics also is extremely capable of evolving into an offering that will allow for future specialized and degree programs through a SPH.

3) **Mental Health and Addictions:** Mental illness and addiction are growing contributors to Years Lost due to Disability (YLD) worldwide. Their co-occurrence with other diseases contributes to high medical costs and overall poor quality of life. UCSD has a long history of addressing tobacco use through public health research, interventions, and policy. Depression, anxiety, trauma, and serious mental illness and the addiction issues of tobacco, opioids, and marijuana (medicinal and use disorder) interplay with other health care problems, and will benefit from a public health perspective. Emphasis on preventive mental health, integrated care, quality measures in mental-health status, and a registry model for targeted treatments are just some of the innovative contributions the UCSD SPH can make to the management and prevention of mental illness and addiction. The Global Mental Health Initiative is an example of a recent effort to address stigma and need to increase awareness about the global impact of mental illnesses and need for novel population based interventions.

4) **Healthy Aging and Longevity Science:** Demographic and health transitions across the globe are leading to rapidly rising numbers of older adults in many nations. In the US, the number of people over age 65 is projected to double from 46 million (15% of the population) today to 98 million (24%) by 2060. Increasing morbidity and disability with aging leads to a variety of social and economic challenges for the society as a whole. Aging trajectories are influenced by a complex interaction of biological (including genetic) vulnerabilities and resilience factors, built and social environments, and health behaviors and exposures. A large portion of healthcare costs are incurred during the last two years of life, and many older adults will enter a long-term care facility even though they may prefer to “age-in-place.” At the same time, many older adults continue to function at a high level and make major contributions to the welfare of the society as a whole, including younger generations. Biopsychosocial studies of exceptional longevity including positive characteristics such as resilience, optimism, wisdom, and social support, along with a healthy lifestyle, can increase opportunities for wellness at both individual and population levels.

5) **Women, Gender and Health:** Critical public health issues affect women and children and are exacerbated by gender inequities which have led to increased U.S. rates of maternal mortality, especially in underserved women and gender-based violence which is made visible through the “Me Too” and “Time’s Up” movements of this past year. Other areas of concern include reproductive and sexual health including access to birth control, family planning services and uptake of vaccinations, menopause-related morbidity, chronic disease survivorship, cognitive aging, and prevention of disability as women reach very advanced ages with multiple morbidities. The study of sexual minority women including lesbian and transgender women, as well as gender non-binary people is critical, as such individuals disproportionately experience discrimination and violence, and have higher rates of morbidity and mortality than cis-gender women. Multiple nationally and globally-renowned research programs focusing on diverse public health issues facing women and on understanding gender differences and disparities in health currently exist at UCSD. Notably, our public health community encompasses the Center for Excellence in Women’s Health, the Center for Maternal Child Health/Perinatal and Pediatric Epidemiology, and the UCSD Center on Gender Equity and Health (Appendix E), combining more than 50 faculty, postdoctoral and graduate students from multiple disciplines including epidemiology, preventive medicine, complementary and integrative medicine, social and behavioral science, health behavior change, basic science, pediatrics, psychiatry, reproductive medicine, nephrology, and geriatrics.

**A SPH is Needed to Unify Fragmented Educational and Research Programs**

Currently, teaching and research efforts in public health are fragmented across the UCSD campus. There are public health courses and projects being led in the departments of FMPH and Medicine, within UC San Diego Health Sciences, as well as in Education, Anthropology, Engineering, SIO, and many other departments, schools, and programs on campus. Although these efforts are each strong individually, UCSD is not presently recognized as a world class hub for public health. Current efforts would be enhanced if they
were unified within a school of public health, particularly given the commitment of top leadership at UCSD to have a SPH and the focus on public and global health as a UCSD priority. As a designated and focused point for public health collaboration, a SPH at UCSD would reduce fragmentation and promote synergy of public health efforts on our campus, such that our university becomes highly competitive nationally and internationally.

Identification as a School will provide an educational home and serve as the foundation for cross-campus synergies, which will amplify the reach of the existing individual degree programs. The higher profile of a School will expand opportunities to build collaborative educational and research programs that make UCSD into an even stronger force for the advancement of population health and well-being.

As a SPH, we will be better positioned to develop and institutionalize the cross-disciplinary partnerships through which team science can thrive at UCSD. The university’s unique expertise in traditional and non-traditional public health areas positions us to raise the institution’s profile among universities with a SPH, and to contribute importantly to the effort to meet state and national needs for an expanded and highly trained workforce in the public health sector. The school will facilitate and mentor junior faculty investigators, as well as support larger center and program level grant applications which build on our successful grant history in public and global health. Designation as a School, with the aggregation of collaborative assets it provides, will further leverage this success.

As a School, we will provide improved career and alumni services, enhance student life, and accelerate the success of students and faculty. The higher profile accorded to a School will not only facilitate recruitment of the highest-quality trainees for our many programs in public health, but also will help in the recruitment of non-healthcare professional students such as those in engineering, business, and policy with an interest in collaborative education and research efforts in public health. Many healthcare students (in the School of Medicine and SSPPS, for example) and those in the clinical arena are interested in global and public health, and linked SPH educational experiences will help engage them fully at UCSD instead of going to other institutions where education and research in public health are better coordinated. As an example, we are aware that a significant number of our medical students pursue MPH degrees at universities distant from UCSD (even on the East Coast), which fully removes them from our UCSD learning environment for a year. A School will generate income by expanding class sizes with its associated tuition, produce new collaborative training and research grants, and encourage philanthropic support that might occur only with recognition as a top-ranked, accredited School. Establishing the SPH will allow parity with education units at other universities and heighten UCSD’s regional and national profile and recognition as a top-tier school, as opposed to an institution with somewhat disaggregated, stand-alone programs.

**Leadership and supporting structures and processes to enhance collaboration:** UCSD Chancellor Khosla strongly supports the proposed SPH. Other Vice Chancellors and Deans throughout our campus have encouraged collaboration and partnerships. Their support will help UCSD create a transformative SPH that is well integrated into our campus culture and philosophy. The Executive Council and Advisory Group that were assembled to assist with this proposal have also demonstrated a very positive tone for novel collaborations. Similar to other UCSD schools, institutes, and centers, with the creation of the SPH we will establish institute guidelines for the inclusion of all faculty who desire to move their primary appointment to the SPH from another UCSD department or division, or take on active secondary appointments in the SPH.

**The Need to Address the Shortage of Public Health Professionals**

Issues that create an expanding need for qualified public health professionals in the nation and state include population growth, aging of the population, increasing diversity, emerging diseases and other public health challenges, fluctuating funding sources, implementation of Healthy People 2020 & Building Healthy Communities initiatives in California, and federal healthcare reform. The SPH aims to reduce the national and statewide shortage of public health professionals, while at the same time support the great interest in public health amongst UCSD students (e.g., undergraduates, MD students, PhD students and Fellows) and
faculty seeking to expand their skills and knowledge. We anticipate that initially many of our MPH students will be recruited from our UCSD Bachelors of Science in Public Health (BSPH) undergraduate program, and that we will also get students from other parts of Health Sciences (e.g. MD seeking an MD/MPH program) and others across the campus, including faculty seeking research career awards – such as those offered by the Veterans Affairs Healthcare System, and the National Institute of Health’s career development (K) awards – who will benefit from having a dedicated public health curriculum included in their training plans. Other faculty members may be interested in expanding their public health education and skills through getting a formal degree or doing some coursework.

National Level Need: National organizations have identified both the need for more public health professionals in the field and the need for them to be trained in new non-traditional areas of public health. For example, the Association of Schools and Programs of Public Health (ASPH) forecasts that the U.S. will need 250,000 new public health professionals by 2020. In 2013 the CDC recommended training in informatics, health technologies, collaborative leadership, business processes, and marketing and communication. In The New Public Health (2013), Tulchinsky and Varavikova note that “with aging populations and new technologies revolutionizing medicine, new generations of health professionals and health workers are needed to meet rising demands and expectations,” and that public health education “requires graduate studies with an interdisciplinary approach . . . (and) a wide base of training to understand the broad professional aspects of public health that relate to complex and rapidly changing professions and practices.”

State Level: Numerous agencies in California have supported the need for more schools of public health to prepare more students for the California workforce. The California Workforce Investment Board and Office of Statewide Health Planning created the Health Workforce Development Council, which evaluated and reported on the “urgent and important need for California to expand its [public] health workforce capacity” and noted that “California is already experiencing statewide and regional shortages and misdistribution in many critical health professions.” Sadly, the findings were similar to the 2007 report of the University of California Office of the President (UCOP), which found that “the California public health workforce is seriously deficient in training, preparation, and size,” and that California lags behind other states in public health education and capacity, with only 20% of employees in CA public health positions formally trained in Public Health. The California Public Health Alliance for Workforce Excellence has also emphasized a need to have sufficient numbers of competent workers that reflect the communities they serve.

Ongoing Education Needs for Public Health Workers: The California Public Health Alliance for Workforce Excellence report also underscores the need for an expanded public health workforce to address large disparities in health indicators among racial/ethnic groups, and joins the ASPH in affirming that more health professionals from communities most affected by these disparities will help to move this agenda forward. In addition to training the next generation of public health professionals and other professionals with relevant public health expertise, the school will address the public health workforce’s need to remain abreast of evolving knowledge and skills in the field by ancillary formats and programs, such as:

1) Online/distance learning to increase accessibility of training
2) Continuing Education credits to enhance professional skills
3) Certifications, workshops, and in-service training to help San Diego area’s public health workforce expand their training and/or update their skills
4) Serving as a host site for a broad and diverse array of students from undergraduate and graduate academic enrichment programs such as the STARS, Amgen Scholars, CAMP, McNair, LSAMP, and MARC programs (see Appendix C)
5) Partnering with local K-12 schools to promote Public Health and STEM
6) Increase academic preparation and “entry points” for underserved/underprepared students
7) “Public Health in Action” community-based initiatives
8) Education and research outreach into the community / community engagement
9) Utilization of the newly created Innovative Cultural and Education Hub in downtown San Diego, which will serve as an entry into diverse neighborhoods throughout San Diego’s urban core, and be vital for applied research and volunteer opportunities, as well as courses, workshops, and seminars

10) Serve as an academic partner to our VA and Military Health Centers of Excellence in San Diego to help our veterans and military personnel

11) Become an international public health Center of Excellence as the host program for public health administrators, policy makers, and health providers from Mexico, Latin America, and Pan-Pacific countries

12) Partnering with local industry leaders in biotechnology and information technology to promote public health and create opportunities for students

RELATIONSHIP OF THE UCSD SPH TO OTHER UC SYSTEM & REGIONAL PUBLIC HEALTH EDUCATIONAL PROGRAMS

Relationship to Existing Schools of Public Health within the UC System

Existing UC Schools of Public Health include those at UC Berkeley and UC Los Angeles. In addition, other proposed UC Schools of Public or Global Health are being considered at Irvine, Merced, Davis (School of Population and Global Health) and San Francisco (Global Health). We are in discussions with colleagues at the Schools of Public Health at UCLA and UC Berkeley, and expect to have letters of support from those campuses. Appendix H includes a strong letter of support from UC Irvine, and we expect to obtain supportive letters from other campuses as well.

We are very supportive of the other UC SPH proposals and look forward to developing a UC system network similar to the Schools of Medicine network. This will help address the serious shortage of public health professionals. We appreciate that there are unique local community and student needs at each of these institutions and their communities. We also know that, similar to the numerous medical schools within the UC system, there will be unique strengths across these different schools as well as a great opportunity for the leadership (Deans, Associate Deans of Education, etc.) of the different schools to create synergy and unified responses to critical issues. Collaboration is increasing in UC Health across the UC system, and collaborative efforts need to be forged by the public health strengths at all the UC Health system sites, so that the needs of our students, local communities, and state can be met.

We have identified traditional and non-traditional areas of public health where UCSD will uniquely excel or excel together with other campus schools. Important examples are our expertise in the area of climate change, for which Scripps Institution of Oceanography is ranked first in the nation.

Another unique area of strength of UCSD within the UC system is the opportunity to understand and improve border health, given our close proximity to Mexico and multiple border research projects.

The proposed integration of the SPH into UCSD Health Sciences and the UCSD Health Care system is unique, and will provide for natural alliances addressing population health and specific diseases. Our faculty in public health already have extensive ties to UCSD Health’s highly ranked Moores Cancer Center, a relationship not available at UC Berkeley, and not tightly connected at UCLA. Having a SPH on our medical campus with the La Jolla hub of our Health System enterprise and the Altman Clinical and Translational Research Institute (ACTRI) soon to be accessible by only a 5-minute walk across a pedestrian bridge, will allow UCSD to facilitate such efforts. We envision our SPH would significantly complement other UC SPHs, as well as provide new educational efforts, along with those at the UCLA and UC Berkeley SPH.

Longstanding partnerships between UCSD and the military (the Navy in particular) and Veterans Affairs (VA) health care, reflect the high concentration of military institutions in the San Diego region. In fact, the San Diego VA is contiguous with the UCSD campus which has been an important bridge for success in the
SOM and SSPPSS. These unique alliances also set us apart from other UC campuses. San Diego County is home to 18 military installations. Public health issues of poverty and homelessness, mental health and addiction, and climate change initiatives are particularly relevant to the military and VA. Having expertise in these areas allows us to address state and national needs in critical areas that distinguish UCSD from our sister campuses. As an internationally recognized leader in mental health and addictions treatment and prevention, UCSD has a unique opportunity to become only the second SPH nationwide (the other being the Bloomberg School of Public Health at Johns Hopkins University) to focus on Mental Health and Addictions.

Our campus and its myriad links with the greater La Jolla mesa biotechnology community have great strengths in Bioengineering and Technology. In its five-year plan, our sister campus at Berkeley is focusing efforts on technology. We anticipate that both UCSD and UC Berkeley, where Bioengineering programs are nationally ranked 3rd and 6th, respectively, are positioned both alone and through collaborations to contribute significantly to state, national, and global advances in public health. The SPH at UCLA does not emphasize collaborations with Bioengineering and Nanoengineering which is a great potential strength for the UCSD SPH.

Relationship to Other Regional Public Health Educational Programs

Within Southern California, excluding the University of California, there are Schools of Public Health at San Diego State University (SDSU) and Loma Linda University.

**SDSU Partnerships**: UCSD programs in Public Health have a long history of close partnership with the SPH at SDSU, including both our General Preventive Medicine Residency, founded in 1983, as well as our UCSD/SDSU Joint Doctoral Program in Public Health, founded in 1990. The recently approved joint doctoral program on Interdisciplinary Research on Substance Use is another example of our ongoing commitment to the SDSU partnership. We also collaborate with SDSU in many diversity and cross-border initiatives, for example, the UCSD/SDSU Cancer Center Comprehensive Partnership, a collaborative program aimed at reducing the burden of cancer among Hispanic/Latinos in San Diego and Imperial counties. We are very committed to maintaining and enhancing these important collaborations with SDSU as we move forward as a School of Public Health. Throughout this process we have been engaged and transparent with SDSU, and have reaffirmed our ongoing support for the Joint-Degree programs and other joint activities that will remain between our campuses, even as the SPH is established.

Our SDSU collaborators have provided a letter of support for our proposal (see Appendix H). We believe that San Diego, as a large metropolitan geographic area, similar to Boston, Atlanta, New York, Los Angeles, and Baltimore, can similarly support multiple schools of public health. There is a need for another school of public health to support more students in San Diego County and to expand our ability to enhance both Universities. The SDSU Graduate School of Public Health has many strengths, which include community engagement, community-based participatory research, health disparities research, racial and sexual minority health and health equity in public health, environmental health assessment, and surveillance. We will be complementary in many ways but we will also differentiate in the new areas that are outlined in the proposal, particularly in population health, where, because of our location within Health Sciences, we are a part of UC San Diego Health and other clinical systems. Also because of Scripps Institution of Oceanography, we will have unique potential to focus on climate change. Being in a medical school with a strong and large Department of Psychiatry, we are uniquely situated to develop a strong mental health and addiction track. Because of the institutes and centers related to healthy aging and longevity science, as well as departments of geriatric medicine and geriatric psychiatry, we are also uniquely situated to focus on healthy aging and end of life issues. We also have a world-class School of Engineering and the Qualcomm Institute that will support a unique and focused concentration on technology and data science.

**Loma Linda University**: Loma Linda’s SPH focuses primarily on training future public health practitioners and offering DrPH degrees rather than training research oriented PhD students. Loma Linda’s research base is more modest than that at UCSD, UCLA, or Berkeley. In our graduate programs we seek to
contribute to the next generation of researchers in the field as well as to the need for public health professionals with training in areas of contemporary need.

**Relationship within the UC San Diego Campus**

At UCSD, we know that collaboration across disciplines generates new ways of framing problems and solving them, as well as enhanced innovation and entrepreneurship. Our campus partners clearly see the benefit of a SPH in organizing the cross-disciplinary partnerships that will enhance our educational, research, and service missions. Throughout the pre-proposal process we have engaged many of our cross-campus constituents and have been met with enthusiasm, thoughtful input, and a respectful and collaborative exchange of ideas. This broad-based input to the pre-proposal reflects the academic rigor/merit, perceived need for the SPH, and strategic planning fit within the UCSD campus.

We envision UCSD’s SPH to be anchored in the traditional core competencies of public health, but in addition leverage advances across the campus in areas such as the life sciences, genomics, oceanography and geoscience, data science, design thinking, informatics, big data science, and ethics, all of which are strengths on our campus. Our vision is to build these cross-collaborative domains into the core of the SPH in our effort to create a new approach to public health education, research, and practice.

The cross-disciplinary work we envision in the SPH will build on existing efforts. As described below, there are strong research collaborations between faculty in the SIO and FMPH, and between faculty in the Jacobs School of Engineering. These research collaborations will almost certainly deepen with the establishment of the SPH. There has been less collaborative work, to date, in the development of educational programs, but that has begun to change as well. As mentioned in the letter from Al Pisano, Dean of the Jacobs School of Engineering, faculty in the JSOE and SPH are exploring the development of a variety of joint degree programs, including a potential Master’s program in Global Health Technology and Practice. Similarly, we will explore prospects for a joint Master’s program with SIO in Climate and Public Health. As noted in the letter from Margaret Leinen, Dean of SIO, two faculty members have been jointly recruited by SIO and Health Sciences. Further, SIO and Health Sciences have proposed recruiting an additional two faculty members.

Faculty in FMPH are already working with colleagues at SIO, the School of Engineering, and the Department of Psychiatry on developing additional concentrations in the MPH program. Potential additional concentrations include climate and public health, engineering and public health, mental health and public health, and population health/bioinformatics. These potential concentrations are still works in progress, but courses in them would likely largely consist of courses already being offered; to the extent that new courses are required, resources would come from tuition revenue from the MPH program.

**UC San Diego Health Sciences, the UC San Diego Health and Local Health Care Providers:**

Increasingly, the boundary between clinical practice and public health is becoming blurred as health care has moved from a cottage industry to one organized around health systems, and as those health systems have begun to focus on improving population health, rather than simply focusing on the health care needs of individual patients. In recent years UCSD Health Sciences has seen enormous growth in its clinical enterprise with a strong commitment to growing the health system and focusing on population health. The SPH, organizationally and physically based in Health Sciences, will help Health Sciences develop a broader system perspective on health and wellness.

**UC San Diego Health** is the region's only academic health system, is top ranked by U.S. News & World Report and has a $1.5 billion operating budget. There are 8900 employees, including 1286 physicians in 18 Departments, 1884 nurses, 913 Residents and Fellows, and a full ranges of clinical services. There are 808 beds, including the Jacobs Medical Center, the UC San Diego Medical Center in Hillcrest and Thornton Hospital, Moores Cancer Center (1 of only 45 National Cancer Institute-designated comprehensive cancer centers in the country), the Shiley Eye Institute, and Sulpizio Cardiovascular Center. Clinical research
includes 1400 clinical trials with 250 new trials each year, including about 7000 subjects in active treatment. UCSD Health has recruited a large and talented group of global and public health oriented faculty whose work focuses on infectious diseases and a variety of chronic medical conditions, behavior change, mobile health (mHealth), and other technology-oriented research. The strength of UCSD’s innovative programs in information technology and biotechnology can be utilized to provide unique opportunities in San Diego to better link large data sets to develop new solutions to public health problems. For instance, our SPH can collaborate with the Health Sciences clinical enterprise in aggregating patient data not only from UCSD, but also acting as a catalyst to bring together information from the five UC Health Sciences campuses into a single repository; indeed, the Altman Clinical & Translational Research Institute (ACTRI) in Health Sciences has been leading such an effort. Training programs through ACTRI have made available their educational resources (e.g., clinical trials training) to public health postdoctoral fellows. Our planned SPH, can continue to utilize these resources in its educational and research efforts.

Rady Children’s Hospital San Diego (RCHSD) / Rady Pediatric Genomics and Systems Medicine Institute: Rady Children’s Hospital of San Diego (RCHSD) provides a unique research infrastructure. It is the largest children’s hospital based on hospital admissions in California and is the only hospital in San Diego County dedicated to pediatric healthcare. The healthcare system also serves Imperial and southern Riverside counties. Over 1.9 million children have received care within the healthcare network since 2000. This healthcare system consists of over 30 medical and surgical pediatric subspecialties. Physicians are faculty members at UCSD, Department of Pediatrics, and research is engrained in the mission statement. This unique environment provides healthcare for over 90% of the geographic area at all stages of care from primary and subspecialty care to inpatient services. Access to all episodes of care within one electronic health record, EPIC, and fosters research on the healthy, the rare condition and longitudinal studies. A unique standardized clinical records system built on EPIC allows customization for easy, standardized capture of research-relevant information in the clinical record. Currently, there are more than 600 active research studies by more than 150 investigators at Rady Children’s; this includes more than 150 active clinical trials. Research is fostered, and all families have an opportunity to donate biologic materials for clinical research at each encounter. Rady Children’s Hospital is healthcare network that focuses on preventing, diagnosing, treating, and curing childhood diseases through clinical and systems medicine research.

Scripps Institution of Oceanography (SIO): SIO is the lynchpin of UCSD’s program in environmental and earth sciences and is ranked 4th in the world and first nationally, and is a unique resource within the UC System. In collaboration with SIO, we are poised to make important contributions to the study and mitigation of the public health consequences of climate change, including increased pediatric malnourishment in Africa due to reduced crops and increased malaria and other previously uncommon infectious diseases in North America. Faculty in Health Sciences, SIO and cross-campus departments are jointly investigating and analyzing climate data to see how our environment impacts food production, air quality, chronic diseases, and water availability. Current projects investigate human adaption to urban growth, climate variability, and small-scale extremes (e.g., heatwaves) that influence health outcomes, particularly for vulnerable urban subpopulations such as children, impacts of indoor cook stoves on the health of villagers in India, extreme weather and mental illness, coastal issues including harmful aerosols generated after sewage spills and harmful algal blooms. Two joint faculty recruits with positions in SIO and UC San Diego Health Sciences represent a first step in realizing the vision for a nexus of climate change and public health unique to UCSD and the UC System. The Human Health and the Oceans (H2O) Research Council was established with representatives from SIO, Health Sciences and the General UCSD Campus, to discuss research opportunities and directions at the interface of human health and ocean sciences.

Jacobs School of Engineering (JSoE): As the largest engineering school in California, JSoE is ranked 13th nationally, behind only UC Berkeley among UC campuses, and UCSD Bioengineering is ranked 1st nationally by the National Research Council of the National Academies. Advances in communications technology, computer science, nanotechnology, bioengineering, design, and human-computer interaction will support new methods for monitoring, understanding, and maintaining public health. Current examples of
collaboration include the Center for Wireless and Population Health Systems (CWPHS), which also leverages the analytical power of the San Diego Supercomputer Center (SDSC), and the innovative IEM which merges efforts in Engineering with UC San Diego Health Sciences efforts, and the “Center for MHTech” between School of Medicine’s Department of Psychiatry and the JSOE focusing on applications of technology to detection, real-time monitoring, and machine learning-based predictive algorithms for mental health and addictions. In addition, JSOE Agile Research Centers such as the Center for Wearable Sensors and Center for Microbiome Innovation are highly synergistic and are making active contributions to the interdisciplinary public health research environment at UCSD.

The Center for Microbiome Innovation (CMI): The CMI was founded as an Agile Center in the Jacobs School of Engineering, but is unique in having Health Sciences and Biological Sciences as founding partners. Directed by Professor Rob Knight and with a Leadership Team of faculty drawn from across campus, the CMI fosters academic-industrial collaborations to generate, test and deploy the next generation of microbiome technologies and make them broadly available to the UCSD community. In addition, The Knight lab develops technologies to read out the microbiome and analyze microbiome data, including the popular UniFrac distance metric (cited over 3000 times as of March 2018) and QIIME pipeline (cited over 10,000 times), and laboratory protocols allowing thousands of barcoded microbiome samples to be sequenced simultaneously. These technical advances led to many biological discoveries relevant to public health including links between the gut microbiome, diet, obesity, cancer, and neurological diseases. The Knight lab has a high-through-out sample preparation infrastructure developed for the Earth Microbiome Project and American Gut Project, which Knight co-founded and directs.

Qualcomm Institute: QI houses over 600 faculty members from 26 different academic units across the UCSD campus in computer science, engineering, social and behavioral science, health and data science areas. An entire floor of the six-floor QI building is devoted to 2-3 year placements of companies (from start-up to large, publicly traded entities) that have either spun off from UCSD or that are interested in closely aligning their R&D efforts with scientists at UCSD. The intent is to accelerate the translation of the knowledge produced in the research arena so that it scales and affects the marketplace. We envision a similar model for public health startups.

The Design Lab: The Design Lab draws upon almost all areas within the university: working with the schools and divisions of Art and Humanities, Medicine, Global Policy and Strategy, Engineering, Management, and Social Science. The Design Lab is focused upon people-centered approaches to complex sociotechnical systems and is building a substantive body of theory and evidence-based findings to establish a solid scientific basis for design. Founded by Don Norman, one of the most widely acclaimed scientists in the field of design, the Design Lab advances the cause for design thinking that is becoming recognized as increasingly essential for solving the kinds of problems faced in public health.

Skaggs School of Pharmacy and Pharmaceutical Sciences: Given that UCSD has one of the few pharmacy schools in California, leveraging the SSPPS is another unique opportunity, including a focus on pharmaeconomics, pharmacoepidemiology, and pharmacosurveillance that can be accessed by SPH faculty and students. SSPPS sponsors programs in population-based medication management, research on neglected tropical diseases, CMV, and Zika, and a joint survey with School of Medicine assesses the incidence of Hispanic-specific cardiac disease in San Diego County.

Psychiatry Department (in School of Medicine) and Psychology Department (in Social Sciences): The highly ranked Departments of Psychiatry and Psychology are strong assets for the SPH. There are robust connections with public mental health programs in psychiatry, including MHTech at the interface of mental health and technology, telemental health to improve access to mental health treatment, primary care integration of mental health (including a joint residency training program between Psychiatry and Family Medicine), and outcome-based research in mental health care. There is excellent implementation science research in areas such as public sector mental health, substance use disorder treatment, child welfare and
schools. Established criminal justice partnerships have been made with the California Department of Corrections and Rehabilitation, National Association of Drug Court Professionals, and other criminal-justice organizations nationwide and internationally. We lead the development of the International Consortium of Universities on Drug Demand Reduction. These strengths will be augmented by an SPH and allow UCSD to become a national leader in population-based mental health and addictions identification, prevention, and treatment.

**UC San Diego Center for Healthy Aging:** The Center is a collaboration involving all our UCSD schools (Medicine, Engineering, Pharmacy, and Management) and all four divisions on the general campus (social, biological, and physical sciences, arts and humanities). It brings together academics, professionals, and trainees in aging-related healthcare, technology, management, architecture, business, and social sciences to support healthy and independent aging. We anticipate numerous opportunities for engagement between the center and the proposed SPH that can lead to not only preventive measures to foster health aging, and also provide an emphasis on the life-long pursuit of quality in health. Focus on how to live and age well will help shift healthcare to an approach that prioritizes healthy living across the entire lifespan, preventing illnesses that account for most of the healthcare costs during the final years of life.

**Institute of Engineering in Medicine:** The IEM is an interdisciplinary Institute that aims at accelerating discoveries of novel science and technology to enhance healthcare through teamwork interfacing engineering and medicine, and facilitate its translation to clinical application and commercialization. It has focuses on diseases of great public health concern (Cardiac, Neurological, Musculoskeletal, Cancer, Diabetes, Perinatal, and Aging), as well as technologies such as imaging, nanotechnology, medical devices, and vaccine engineering.

**Artificial Intelligence for Healthy Living Center (AIHL):** UCSD is collaborating with the IBM Cognitive Horizons Network, a consortium of top universities working with IBM to develop AI technologies. The AIHL Center connects the technology, artificial intelligence (AI) strengths of IBM and with life sciences knowledge from UCSD, including faculty from computer science, cognitive science, engineering and medicine. Example projects include the study of the impact of daily habits, the environment, genetics and the microbiome on the cognition of older adults.

**Institute for Practical Ethics (IPE):** The IPE was launched by the Division of Arts and Humanities, however core faculty represent several departments/divisions within the university, including philosophy, history, sociology, medicine, and others. Through the IPE, UCSD is becoming a leading voice on the ethics and social impact of cutting edge science, technology and medicine. The mission of the IPE is to develop and promote research on ethical issues facing the public, with special emphasis on fostering deliberation among ethicists, scientists, clinicians, and policy makers. UCSD is one of the world’s most prolific producers of technology, medical innovations, and scientific knowledge. It is the aim of the IPE to thoughtfully and responsibly examine these questions, including in the critically important realm of public health. At present, the IPE has two working groups, including one on the “Ethics and Social Implications of Active Genetics”, which is a collaboration with the Tata Institute for Genetics and Society (see below). Activities pursued in this area include running workshops and training scientists, as well as research and scholarly activity. Example projects focus on ethical implications of genetic engineering. The second current area of emphasis is on “The Ethics and Social Implications of Big Data”, which is a collaboration with the newly formed UCSD Halicioglu Institute for Data Science. Example projects focus on privacy challenges, as well as the meaning of uncertainty in the realm of data science.

**Tata Institute for Genomics and Society (TIGS):** TIGS is a partnership between UCSD and the India-based philanthropic Tata Trusts and the Institute for Stem Cell Biology and Regenerative Medicine (InStem) in Bangalore, Karnataka, India. The overarching goal of TIGS is to advance global science and technology research in a socially conscious and ethical manner to ultimately find solutions to address some of the world’s most pressing issues. For example, TIGS scientists are currently developing approaches that
utilize genetic engineering of insects for control of vector-borne diseases, a major public health problem. Pioneering experiments conducted at UCSD have demonstrated that the malaria vector mosquito *Anopheles stephensi* can be genetically engineered using Active Genetics to express genes targeted against the malarial parasite *Plasmodium falciparum*, and that this new trait is inherited by nearly all of the mosquitoes’ progeny. Institute researchers and collaborators are expanding on this work with a goal of developing mosquito strains that may ultimately be used to substantially reduce malaria transmission - a disease that causes an estimated 450,000 worldwide deaths per year - using a vector replacement strategy.

**Center for Global Justice (CGJ):** The CGJ facilitates interdisciplinary research on poverty and equitable global development. The CGJ is recognized globally for its strategies of organized transformation of harmful social norms and associated practices, such as genital cutting and girl-child marriage. The CGJ is also home to the UCSD Cross-Border Initiative, focused on cross-border poverty research; and The UCSD Community Stations, a network of three field-based research hubs located in underserved communities throughout the San Diego-Tijuana region, where research and teaching on urban, environmental and public health challenges are carried out collaboratively with non-profit community partners.

**Public Health Law and Policy / California Western School of Law:** A critical area of importance for interdisciplinary education of public health students is training in international and national public health policy, law, and regulatory science, which serves an important role in governmental, non-governmental, and advocacy-based public health activities. Policies and the law represent both important tools and strategies that can be used to support public health goals or in some cases can act as significant barriers to adoption of evidence-based public health interventions and programs. Some examples of public health successes in which law was instrumental include enhancing immunization, motor vehicle safety, safer workplaces, nutrition, tobacco control, and reducing tooth decay. Critically, in order to ensure the success of local, state, national, and multijurisdictional public health initiatives, policy and legal analysis and practice is needed. The proposed SPH will leverage existing collaborative partnerships with California Western School of Law’s (CWSL) the Institute of Health Law Studies (I HLS) which offers an interdisciplinary center linking legal, health, medical, and scientific communities. UCSD currently partners with CWSL on a joint master’s degree in Health Policy and Law. Shared faculty at UCSD-SOM and CWSL offer several courses on health policy, law, regulation, ethics, and advocacy, and have also offered applied and experiential learning opportunities including courses where students meet health policymakers in Washington DC. Additionally, the SPH will bridge a new partnership with the University of San Diego School of Law (which offers a health law specialization), where faculty from both institutions have already conducted scholarly work on the legal and ethical implications of emerging technologies, which will feed into the aspects of our SPH focused on the ethical and societal impacts of new public health innovations.

**Center on Gender Equity and Health (GEH):** The mission of the Center on Gender Equity and Health is to improve population health and development by improving the status, opportunities and safety of women and girls, globally. The Center focuses on conducting innovative global public health research, medical and academic training, and development and evaluation of evidence-based policies and practices related to reducing major forms of gender inequity (e.g., girl child marriage), and gender-based violence (e.g., partner violence, sexual assault, sex trafficking), one of the most pervasive and least addressed major contributors to global morbidity and mortality. Nationally and globally-recognized for leading scholarship and training on these issues, GEH partners with major global stakeholders (e.g., the Bill and Melinda Gates Foundation, the David and Lucile Packard Foundation) to conduct research to create sustainable programs and policies to promote health via improvements in gender equity and reductions in gender-based violence.

**Research Ethics Education:** Ethics training and resources across the campus are important resources for the SPH. The UCSD Research Ethics Program is one of the excellent resources for faculty, staff, and students in learning and managing ethical challenges that arise and must be considered in science, engineering, and other academic scholarship. The Center for Ethics and Spirituality is another resource for broader ethical, spiritual, and moral issues that is available to public health students and the campus.
Student Society for Medical Ethics supports undergraduate and graduate medical students and others interested others interested to discuss ethical challenges and related issues. New ethical challenges arise with mobile, imaging, pervasive sensing, social media and location tracking data collection methods that are available to researchers and especially relevant for some public health studies, including ethics, regulatory and social issues. The UC San Diego Connected and Open Research Ethics (CORE) project is a resource and learning community that is focused on these new technology challenges. The CORE is a web-based tool that links researchers, ethicists, technologists, students, and other stakeholders in a manner that is developing best practices. Responsible Conduct of Research in less Developed Countries is a unique Training Grant for junior faculty in the Middle East that is based at UCSD.

Relationship to San Diego Community & Global Partners

The Public and Global Health faculty in Health Sciences have already developed excellent partnerships in the San Diego community, nationally, and globally. The additional cross-campus faculty network will further expand the range of these collaborations. There are many community and global partnerships which are described in more detail throughout the pre-proposal in other sections (including the San Diego Supercomputer Centers work with mobile sensors, AI, and big data; the UCSD School of Global Policy and Strategy - GPS; Center for Aerosol Impacts on Chemistry of the Environment, CAICE; Biostatistics and Mathematics; Anthropology; Social Sciences; etc.).

For this proposal we highlight a few key distinctive partnerships for the SPH, including with many partners in border global health, with the military and veteran population, and around the world.

Partnerships in City Heights and South Bay Neighborhoods: The UC San Diego Center for Community Health (CCH) runs clinical and public health programs that serve residents of the City Heights and South Bay neighborhoods -inclusive of El Cajon, Imperial Valley, South Bay, Tijuana, and Chula Vista. Faculty from the CCH work with faculty in FMHP through the Center of Excellence in Health Behavior and Equity, through the UC-Office of the President’s Healthy Campus Network, and the HRSA funded Hispanic Center of Excellence. They already teach in the BSPH courses. In the SPH they can offer educational practicums and capstones for the BSPH and MPH degrees, and broker relationships with their trusted community partners as we develop public health research initiatives for this underserved community.

Collaborations with the U.S. Military and Veterans: The San Diego region has for decades served as a major hub for our nation’s military, with the Naval Medical Center Balboa and the Naval Medical Center Camp Pendleton providing healthcare to active duty personnel and their families. UCSD has many programs designed to support the needs of the military, both in direct service, training, and relevant research of long-term benefit to the military. Many active duty physicians rotate through UCSD residency training programs, including the Preventive Medicine residency program. UCSD has numerous major Department of Defense (DOD)-funded projects such as STARRS (in collaboration with Walter Reed Medical Center in DC) studying the mental health needs of soldiers and veterans with suicidality and Posttraumatic Stress Disorder, a DoD-funded acupuncture study on pain, and many other academic initiatives. We have academic partnerships with the San Diego Veterans Affairs Healthcare System with its 304 bed hospital adjacent to the campus, staffed almost entirely by physicians with active UCSD affiliations. The Navy has an excellent Public Health Division which includes focusing on population health, health promotion and wellness (healthy eating, active living, tobacco free living, etc.), and health analysis from an epidemiological perspective. There are a wide array of public health experts at the Navy Medical Centers as well as in the San Diego military community.

Public Health Issues on the U.S.-Mexico Border: Immediately to our south is the busiest land border crossing in the world connecting San Diego to Tijuana, Mexico. Here, one encounters a completely different set of cultural, ecological and economic factors that impact residents throughout our region. Our shared border with Mexico provides an important opportunity for public health education and research. San Diego County represents a diverse population ecosystem with its distinct regions and widely disparate
socioeconomic levels. The region’s refugee and immigrant populations provide an ideal opportunity for training the next generation of public health professionals. The cross-border region offers insights into cultural, religious, economic, and other social impacts on health behaviors as well as diverse educational, research, and service opportunities. UCSD has many research programs addressing the unique public health issues of our border region, and the new SPH will expand these programs.

Global Partnerships: Our local refugee population is among the largest in the nation, with populations from nearby Mexico, the Far and Middle East, Africa and Latin America. In addition, UCSD has ongoing research and training programs in Mozambique, Ethiopia, Niger, Kenya, Ecuador, Brazil, Peru, India, China, Jordan, Guatemala, and Mexico among others. The SPH will extend the reach of UC into new areas of the world and serve to organize this effort for health-related global experiences and the global health discipline.

ACADEMIC CURRICULUM, DEGREE PROGRAMS, AND ACADEMIC RIGOR

Health and Public Health have been a central focus of UCSD’s School of Medicine since Joseph Stokes III, M.D., an eminent scholar in preventive medicine and cardiovascular epidemiology, was appointed as the School of Medicine founding Dean in 1964. As UC San Diego Health Sciences proposes this School of Public Health, we will continue to foster a rigorous curriculum for traditional and cutting edge educational programs in public health. Here we discuss programs currently offered within Health Sciences, other divisions of our campus, and then outline which of these programs will be implemented within the SPH and the nature of the collaborations and partnerships with other campus programs.

Next Generation School of Public Health (see Figure 1). We appreciate the need for a SPH to be agile and able to pivot quickly to new domains of knowledge, absorb and evaluate them, and then test them in real time, so that they can be quickly, but in an ethically and socially conscious manner, be integrated into educational and research priorities to improve the health of the public. Figure 1 displays the framework of how our students will be engaged in traditional Core Public Health Competencies (yellow rows in figure), cutting-edge “21st century core topical areas” (shown as in white rows), and the seven cross-cutting themes of Technology and Engineering, Global Health, Health Disparities, Data Science and Design Thinking, Business and Public Health Leadership, Health Communications, and Ethics, History and Science (grey vertical bars). These currently identified core topics and cross-cutting themes will evolve over time as new issues become essential for education of public health professionals. We are cognizant of the importance of designing the school from the outset with plans on ways to adapt and evolve.
Current Public Health Degree Programs at UC San Diego

Most of the core Public Health degree programs required for establishing eligibility for SPH accreditation are already approved or developed, except for one additional PhD program. These core structured educational programs are in Health Sciences and led by the Public Health and Global Public Health faculty. We already have the needed core resources for these educational programs through previous investments by the campus and Health Sciences.

UCSD achieves broad and deep coverage of the fields integral to public health, with expertise in the bulk of the 31 major public health disciplines defined by the American Association of Public Health. We already have established strengths amongst our public health faculty in the five core traditional areas of public health education we’ve identified, and we are leveraging UCSD strengths outside of Health Sciences to enhance and build new collaborations to better address 21st Century core areas. The joint / split faculty and secondary appointment faculty add a sizeable number of potential faculty to create clusters of strength in public health education and research. We thus have all the support in sufficient depth for our growing educational program offerings.

In Table 1 below we outline the current public health degree programs at UCSD that will either be incorporated into or have collaborative ties with the proposed school. Following the Table, we describe these degree programs in more detail.

**Table 1: Public Health Degree Programs Inside and Outside of Health Sciences**

Degree Programs within Health Sciences (all these existing programs would move to the new SPH)

- Bachelor of Science in Public Health (BSPH) Program
- Master of Public Health (MPH) Program
- Master of Science (MS) in Biostatistics Program (proposed and under review)
UCSD/SDSU Joint Doctoral Program (JDP) in Public Health
PhD Program in Biostatistics
Master of Advanced Studies in the Leadership of Healthcare Org. (MAS-LHCO)
UCSD/SDSU Joint Doctoral Program (JDP) in Interdisciplinary Research on Substance Use (IRSU)

Degree Programs Outside of Health Sciences (these would not move but have affiliations)

- Bachelor of Arts in Global Health (BAGH)
- Global Health Minor
- Master of Arts in Global Health (MAGH) – pending UCOP final approval

Degree Programs within Health Sciences (to move to the new SPH)

**Bachelor of Science in Public Health:** UCSD’s Bachelor of Science in Public Health was launched in September 2013, and is one of the first undergraduate majors in the country to be developed and administratively managed by a department within a School of Medicine. The program includes required courses in epidemiology, biostatistics, social and behavioral sciences, environmental and occupational health sciences, and health policy. (see Appendix C-I for detailed requirements and curriculum). The attraction of the program is clearly evident as approximately 600 students are enrolled in this major during the 2017-18 academic year. 144 students graduated in 2017. At UCSD, there are three undergraduate degree programs that relate to public health: Public Health, Global Health, and Environmental Systems. Only the Public Health BS program will be moved to the School of Public Health. The FMPH Department chair and faculty are aware and supportive of the move.

**Master of Public Health:** The MPH program was approved by the UC System in August 2017, and will enroll its first students in Fall 2018. Plans are for an inaugural class of 25 students, with expansion to reach a steady state of 50 students per year by the 2020 – 2021 academic year. This class size will be at the lower end of MPH class size nationally. For example, Johns Hopkins and Harvard, the number 1 and 2 ranked programs nationally, have average annual cohorts for their MPH of 250 - 270. UCLA’s program is of a similar size to Hopkins and Harvard, whereas UC Irvine’s class size of approximately 40 is close to what we envision at UCSD. Our intent is to develop a small, high quality program that can capitalize on UCSD’s areas of strength. The MPH will focus initially on core competency areas of Public Health with concentrations in epidemiology and health behavior. As outlined above, we are also engaging faculty within Public Health and other Health Sciences / campus Departments in developing the five 21st Century topical areas as potential new concentrations for the MPH. MPH students will receive a 2-year, research focused educational experience that will include both a required applied practice experience and a scholarly project (see Appendix C-I for detailed requirements and courses).

**UC San Diego - San Diego State University Joint Doctoral Program in Public Health:** The UCSD - SDSU JDP in Public Health is the oldest and one of the most important components of our current public health educational offerings within Health Sciences. The UCSD-SDSU JPD admitted its first students in 1990 and currently has three tracks, which are epidemiology, health behavior, and global health. These tracks each provide advanced training in public health skills designed to prepare graduates for leadership in academia, industry, organizations generating policy analysis and development, and high-level public health positions. (see Appendix C-I for detailed requirements and curricula). The establishment of our thriving BSPH undergraduate program enables doctoral students to develop teaching skills while serving as Teaching Assistants and mentors. With the inauguration of the MPH, opportunities for our doctoral students to serve in a teaching/mentoring capacity will expand, enhancing their professional development. In 2014, the Council on Education for Public Health (CEPH), the accreditation body for schools of public health, recognized the strength of the JDP with a full seven-year accreditation. Even with establishment of the UCSD SPH, we plan to continue this essential joint program between our two schools. Given the varied expertise and missions of SDSU and UCSD, there should be no problem for co-existence of these programs at our different institutions.
**PhD in Biostatistics:** The PhD in Biostatistics is offered jointly by the Division of Biostatistics in Health Sciences and the UCSD Department of Mathematics, and aims to train the next generation of biomedical data scientists across a spectrum of Public Health and biomedical domains. This interdisciplinary program has 11 core faculty from the Division of Biostatistics and Bioinformatics, 5 faculty members from the Department of Mathematics, and participation of faculty from two computer science departments within the Jacobs School of Engineering. This program began in 2015. It is highly selective, having admitted five students in its second cohort from an applicant pool of 108 highly qualified candidates. The program emphasizes mathematical rigor, hands-on training, and collaborative work embedded in research teams (see Appendix C-I for detailed requirements and curricula). Collaborative research projects are drawn from across UCSD Health Sciences. The core courses incorporate theory and data analysis, literate programming, and reproducible research practices. A unique component is the Biostatistics Rotation, in which students complete an interdisciplinary applied data analysis project, under the mentorship of a Biostatistics faculty member in collaboration with a UCSD biomedical researcher. Students are required to complete written and oral reports of their Rotation work, thus gaining important skills in analytic writing and communication. A thesis is required, with both theoretical and applied components.

**Master of Science (MS) in Biostatistics (Proposed):** The MS in biostatistics is a new degree program that is under review for approval by the UC System. Applications to UC Biostatistics MS programs from well-qualified domestic and international students have been increasing, and there are more applicants than can currently be accommodated within the UC system. The program offers experiential learning with both methodological and applied components. Given the exceptional quality of applicants for our PhD in Biostatistics, we anticipate a similarly well qualified pool of applicants to the MS program. We anticipate approval and admission of the first class in Fall 2019 with a class size of 30 per year (see Appendix C-I for detailed requirements and curricula).

**Master of Advanced Studies in the Leadership of Healthcare Organizations (MAS-LHCO) for part-time professional career advancement:** The MAS-LHCO was established in 2001 as the first MAS degree program offered within the UC system. Then UC President, Richard Atkinson, suggested a graduate degree suitable for part-time professional career advancement. The MAS-LHCO program, which has over 100 graduates, is designed to equip clinicians, allied health professionals, and healthcare administrative staff, with industry-specific business knowledge and leadership skills necessary to manage the increasingly complex challenges faced by leaders in health care organizations (see Appendix C-I for detailed requirements and curricula).

**Joint UCSD/SDSU PhD Degree in Interdisciplinary Research on Substance Use (IRSU):** This is a social science research program designed to train students and researchers to conduct cutting edge investigation to reduce the national and global burden of substance use and misuse, including prevention and harm reduction approaches. The program’s mission is to facilitate the development of JDP trainees who are capable of conducting high caliber, high impact and meaningful substance use research to reduce the impact of problems related to substance use and co-occurring diseases. The curriculum was designed to prepare the next generation of leaders in substance use research with the skills and knowledge to advance evidence based and applied substance use interventions, programs and policies. The program has a global orientation. Students complete residencies at both SDSU (year one) and UCSD (year two). Typically students conduct research and work toward advancing to candidacy in year three, writing and defending the dissertation in year four (full curriculum available in Appendix C-I).

**Outside of UC San Diego Health Sciences (collaboration only; not in the SPH)**

**Global Health Program (GHP/Department of Anthropology):** Undergraduate majors and minors in the GHP are administered by the Department of Anthropology. These educational programs provide students with an in-depth understanding of factors related to illness, health, and healing from both a comparative and interdisciplinary perspective that transcends national borders and regional interests, and takes cultural difference and diversity fully into account. The GHP is designed to be intellectually comprehensive,
integrating the social sciences, biological sciences, and humanities. Students combine academic and experiential learning, striking a balance between acquisition of hard skills, critical thinking, and real world knowledge. An important feature of the BA program is a Global Health Field Experience at a research, service, or clinical site either in the United States or abroad, which for majors, culminates in a capstone seminar and senior thesis (see detailed program requirements and courses in Appendix C-III).

**Master of Arts in Global Health (MAGH) Program** through GHP is (currently under UCOP final review with first class starting in 2019). A Master of Arts in Global Health will be an important addition to graduate education at UCSD. The proposed MAGH will provide students with an interdisciplinary curriculum that equips them to examine and address urgent social concerns and with the ability to understand and productively intervene in processes of health, illness and healing across the globe. The proposed MAGH will offer graduate level global health education for our own recently graduated students and those from other universities and healthcare enterprises. It will be especially valuable insofar as many careers in global health require a post-secondary degree in a related field for entry. The one-year MAGH will complement our two-year MPH degree and contribute to preparing students for careers in academia, medical school, NGO and governmental agency work, program development and implementation, health policy, health administration and other related careers in healthcare. We are very supportive and are identifying ways to collaborate and support all the faculty and students, including through shared courses, students being able to take courses in different programs (MPH or MAGH), agreement to be part of a united public and global health faculty community, and opportunities for joint hires and grants.

**Public Health Related Degree Programs and Coursework at UC San Diego Campus** (these programs would stay in their respective schools but new collaborations would be established)

In addition to the public health degree programs presented above, a number of other programs and a great deal of coursework relevant for a future SPH are currently found in Health Sciences and across our campus. With formation of the SPH, we envision programs can become even better organized, increased transparency and access to students, and greater ability to offer a wide range of educational offerings to SPH students. In this section we list the Schools / Programs on the UCSD Campus with Public Health related activities and commitment to the collaborations (Table 2) and also potential future programs / courses with these entities (Table 3). Further description of the Schools / Programs and existing courses are then described in the text according to the School / Program (with additional information in the appendices). We then highlight examples of potential future programs / courses that may grow out of SPH collaborations.

**Table 2: Public Health Related Schools / Programs at UCSD**

- Scripps Institution of Oceanography (SIO)
- Jacobs School of Engineering (JSOE)
- School of Global Policy and Strategy (GPS)
- Rady School of Management
- Design Lab
- Social Sciences & Humanities and the Arts
  - Bioethics, Science Studies, Economics, Anthropology, Global Health Program (GHP), Urban Studies and Planning (USP), Psychology, Sociology, Political Science, UCSD Center on Global Justice, Ethics, etc
- UC San Diego Health Sciences, School of Medicine, and Skaggs School of Pharmacy and Pharmaceutical Sciences (SSPPS)

**Table 3: Examples of Potential Future Programs / Courses in Conjunction with the SPH**

- Engineering, Technology, and Population Health;
- Climate Change, Environmental Health and Public Health;
- Mental Health and Addictions;
- Healthy Aging and Public Health;
- Health Systems, Population Health, and Health Policy;
Global Health Training in Infectious Disease;  
Public Policy and Public Health;  
Gender Equity and Public Health;  
Biostatistics and Public Health Data Science;  
History of Public Health;  
Microbiome Innovation;  
Mobil Technology;  
Ethics, Policy and Technology in Public Health; and  
Interdisciplinary Health Sciences Training Collaborations / Joint Degrees

Scripps Institution of Oceanography: SIO is rapidly increasing its orientation to health effects of climate change and oceans. Examples of this are shown by their major new $4 million project to evaluate the health effects of living on the coast, and their recent partnership with UC San Diego Health Sciences in making joint faculty appointments. SIO is also particularly interested in training international scholars, since so many of the world’s public health issues are in other (and less developed) nations that do not have relevant high caliber training programs. SIO faculty currently teach on climate and health in a training program at the Center for Global Health Research at Umea University in Sweden; students there are primarily from low income countries, many from Africa. This interest in global impact is consistent with the perspective at our proposed SPH where we anticipate many opportunities for educational collaboration on a global scale. Currently SIO offers courses such as SIO 116: Climate Change and Global Health, and SIO 189 and 289: Pollution, the Environment, and Health. Particularly with joint faculty in place, Health Sciences is actively engaging with SIO faculty in the development of collaborative courses and degree programs attractive to students with combined interests in climate change / ocean science and public health. As a first step, courses cross-listed to fulfill requirements for both SIO and SPH students will be established.

Jacobs School of Engineering: Our educational collaborations with Engineering include the participation of faculty from the Bioengineering, Computer Science and Engineering, and Electrical and Computer Engineering Departments at JSOE, which together offer eight courses at the core of the SPH curriculum including: Clinical Bioengineering (BENG 193), Algorithm Design and Analysis (CSE 202), Convex Optimization (ECE 273), and a highly popular Med-Into-Grad Initiative immersive clinical training program for PhD graduate students jointly with Biomedical Sciences (see Appendix C-I for full listing). Faculty in Structural Engineering currently offer SE 265: Structural Health Monitoring, which is available to students throughout UCSD. Nearly a third of faculty in the Department of Bioengineering are active in collaborative research efforts with Health Sciences faculty in public health through the JSOE Agile Center for Microbiome Innovation and Center for Wearable Sensors, and are members of the Institute for Engineering in Medicine. This provides a solid basis for the development of cross-listed courses that will fulfill requirements for both JSOE and SPH students.

Social Sciences: The Departments of Economics, Anthropology, Urban Studies and Planning (USP), Psychology, Sociology Political Science and others, all offer courses relevant to core public health topics (see Appendices-III and C-IV). Courses currently available in these Departments could be of great interest to public health students and potentially lead to more advanced joint educational programs. For example, Economics offers undergraduate courses such as Economics of Health Care Producers (Econ 140) and Economics of Health Care Consumers (ECON 141). In addition, faculty are developing a two-course “health field” for doctoral students. Sociology has particular strength in issues of Mental Illness and offers a total of 12 courses relevant to Public Health including Sociology of Mental Illness: An Historical Approach (SOC 136E) and Sociology of Mental Illness in Contemporary Society (SOC 136F). Political Science offers policy assessment and environmental courses. Psychology offers 7 relevant courses, notably Drugs, Addiction and Mental Disorders (PSYC 179) and addiction (PSYC 236).

School of Global Policy and Strategy: At the graduate level, the GPS and Strategy offers tracks in both policy and management which will be useful to SPH students. Examples of some pertinent courses from
GPS are International Health Economics (GPEC 468) and International and Environmental Policy and Politics (GPEC 458). The Policy Design and Evaluation Laboratory (PDEL) is another asset. It is a cross-disciplinary effort housed at GPS that combines advanced social science methodology with the power of information technology to design policies and programs that alleviate poverty; promote health, welfare and security; and enhance accountability. PDEL provides administrative and technical support for research projects and also offers specialized training in the evaluation methodologies that are critical for policy design.

**The UCSD Center on Global Justice (CGJ):** The CGJ facilitates interdisciplinary research on poverty and equitable global development, with an emphasis on collective action at community scale. The CGJ is recognized globally for its strategies of organized transformation of harmful social norms and associated practices, like genital cutting and girl-child marriage. The CGJ is also home to the UCSD Cross-Border Initiative, focused on cross-border poverty research; and The UCSD Community Stations, a network of three field-based research hubs located in underserved communities throughout the San Diego-Tijuana region, where research and teaching on urban, environmental and public health challenges are carried out collaboratively with non-profit community partners. CGJ supports dozens of graduate and undergraduate students annually from all portions of the campus to participate in immersive, supervised, team-based, interdisciplinary field research in the UCSD Community Stations. The CGJ has a particular interest in the disproportionate impact of climate change on the world’s most vulnerable demographics, and has committed to developing neighborhood-scale participatory mitigation and adaptation strategies in local communities across the region. Students from the BSPH, and Global Health major in the Social Sciences Division regularly participate in CGJ programming. CGJ’s community-based infrastructure and network of partnerships will be a valuable asset to the new SPH as it advances its public health agendas locally.

**The UCSD Center on Gender Equity and Health (GEH):** The Center on GEH mission is to improve population health and development by elevating the status, opportunities and safety of women and girls as well as sexual minorities (based on sexual orientation and gender identity), globally. The Center takes a significant leadership role nationally, conducting innovative global public health research, providing medical and academic training for next generation scholars, and supporting development and evaluation of evidence-based policies and practices related to gender inequities, gender-based violence and health. GEH strives to bridge the gap between research and implementation, taking into account on-the-ground challenges and the lived experiences of women and girls as well as sexual minority populations worldwide. As a leader source of high-impact scholarship in this area, GEH will provide unique opportunities for SPH students in the form of coursework and research, and also in understanding the roles of public health in health and human rights advocacy, and in health policy and systems development.

**Rady School of Management:** The Rady School of Management, with its emphasis on entrepreneurship and innovation, will provide SPH students unique educational opportunities. We plan to have a core learning experience on this emphasis for all students. The SPH students may link with Rady’s year-long Lab-to-Market course sequence which provides MBA students the opportunity to work with a team to generate a new idea, develop it, and bring it to market. Rady is currently engaged in a collaboration with the Engineering School JSOE that integrates graduate engineering students into this sequence. We plan to develop similar partnerships with both schools. We foresee engaging Rady’s MBA students with SPH students to partner on innovative projects relevant for public health. Rady offers a non-credit Micro-MBA for UCSD graduate students and PhDs that introduces important business concepts, and provides opportunities for students to network with business professionals. We anticipate also training SPH faculty on these concepts. In addition, the economics and management of health care are key issues in today’s healthcare and public health environments. Courses offered by Rady will equip SPH students in a range of topics relevant for their education and careers in public health. **Examples of current Rady School of Management courses** relevant for Public Health are Project Management, Economics of New Health Technology, Consumer Behavior, and Marketing Communications. A one-year MS in Business Analytics program teaches students to generate, manage, and analyze “big data” sets, which are increasingly common
in health care, and MSBA students completed several projects for a major health care provider in the capstone project for the program. We would envision a collaborative program between SPH graduate students who utilize “big data” as part of their educational programs and projects, to gain tremendously from courses offered in this program. Examples are Rady’s courses in Customer Analytics and in Legal and Ethical Issues in Big Data. Disruptive Technology for Health Care (RSM 454) appears to be of interest for technology oriented public health students. Having the SPH will allow these types of synergistic programs that currently are widely dispersed throughout our campus, to come to fruition through a centralized organization.

**Design Lab:** The SPH will embrace the open interdisciplinary problem solving style that has been effectively implemented throughout our campus, and that is an integral component of the Design Lab. The Design Lab provides an approach to education that has a consumer and systems perspective. Our Design Lab practices people-centered design thinking to address complex sociotechnical systems, always focusing upon the needs and capabilities of the people. Design is an all-encompassing field that integrates business, engineering, the social sciences and the arts to create practical applications for technology that are useful, enjoyable and understandable. As an example, an undergraduate minor (DSGN) focuses on design as a way of thinking based on an iterative cycle of field observation, problem finding, and evaluating alternative solutions and trade-offs, by proto-typing and testing. The primary objective of the minor is to enable students from any major to diversify their studies and incorporate design thinking skills into their academic experience. Planning is underway for a PhD specialization anchored in the Design Lab. Health is the largest research topic in the Design Lab, with an emphasis on prevention. Integration of design thinking with public health will help public health students to see that they are at the interface between people, organizations, society and technology. Currently eight relevant offerings are in place jointly with the Department of Cognitive Science, and include: Interaction Design (COGS 120), Human Interaction Programming Studio (COGS 121) and Cognitive Design Studio (COGS 102C) (see Appendix C-IV for relevant curricula).

**Science Studies:** The UCSD Science Studies Program is a graduate course of study, leading to the Ph.D. degree, in which students complete coursework in science studies in addition to coursework in their home department. Students are provided an opportunity to integrate the perspectives developed within the communication of science, history of science, sociology of science, and philosophy of science, while receiving a thorough training at the professional level in one of those disciplines. In addition to formal coursework in science studies, students participate in a weekly colloquium series, complete internships, and may take directed readings on a variety of relevant topics. At present, the Program involves 21 core faculty members and 47 graduate students from home departments of communication, history, philosophy, and sociology. Biomedical and health sciences are common areas of study within science studies, and there is overlap with many sciences studies faculty also leading courses on bioethics and public health-related topics. Offerings in this program that are relevant to public health students include but are not limited to, Science and Public Policy (HISC 280), The Making of Modern Medicine (SOCG 283), and History, Science, and Politics of Climate Change (HISC 263).

**Bioethics:** Bioethics is a well-established interdisciplinary field that is centered in philosophy but includes interaction with research in public health, medicine, biological sciences, and other social sciences. Bioethics addresses foundational moral questions concerning life in all of its forms and in a wide variety of contexts, including issues in medical and clinical ethics, distributive justice in health care, environmental and climate ethics, and more. The Philosophy Department in the UCSD Division of Arts and Humanities offers a Bioethics Minor intended for students with a variety of academic interests and career goals, including students in the health sciences. Well-trained professional ethicists are in increasing demand, and practitioners and researchers in public health, medicine, information technology, bioengineering, and the life sciences face challenging moral questions and are increasingly expected to have training in ethics. The course of study also plays a key role in preparing students to be informed citizens on questions of pressing importance to everyone. There are several offerings in this program that are relevant to public health students including but not limited to, Biomedical Ethics (PHIL 163), Social Ethics (e.g., PHIL 167), History
Proposed Future Specializations and Degree Programs within the new SPH

The SPH at UCSD will have the necessary public health degree programs and core traditional training found in every SPH throughout the UC system and nation required for our future accreditation. In addition, drawing from the unique programs across our campus will allow formation of specializations and potentially new degree programs that will make our UCSD SPH unique. We envision offerings that will be profoundly cross-disciplinary involving UC San Diego Health Sciences (the School of Medicine and the SSPPS), SIO, JSOE, and Social Sciences, utilizing the faculty and course offerings found throughout our campus, as in part outlined above. Examples of such programs are listed here.

*Engineering, Technology and Population Health: (Specialization Track in SPH and Partnerships):* A revolution in healthcare is underway shifting from “reactionary” care administered by highly trained caregivers in hospitals needed to solve an acute (or even chronic / recurrent) problem, to a new continuous preventive care, where the patient takes charge, and administered by everyone, anytime, and anywhere. A UCSD SPH will be ideally positioned for national leadership in the development of technologies which support classic Public Health educational efforts, by partnering with the JSOE and particularly it’s Department of Bioengineering, the QI, the new Data Science Institute, the Design Lab, and the IEM. In Bioengineering an estimated 30% of the faculty and students are engaged in topics related to Public Health. Thus it is easy to envision how an SPH on our campus will be able to offer unique educational programs that merge engineering principles with public health. Engineering principles are behind important novel and emerging health care programs such as the ability to provide Telemental Health for psychiatric care of remote patient populations; data driven informatics to target psychiatric care to the most needy; and usage of wearable devices and mobile technology for patient centered care. The financing of these innovative approaches to healthcare is an important area for future research, and we also envision students in this track taking courses at the Rady School of Management to increase their understanding of how these innovative technological advances will be funded. A doctoral level course “Dissemination and Implementation Science in Health (FPM 291)” within the UCSD/SDSU JDP is an example of how to link engineering, medicine, and public health. Another example, the JSOE and SPH could create a new joint Master's program in Global Health Technology and Practice. Additional options could include a concentration in the MPH program focused on Technology in Public Health and a combined PhD/MPH in Bioengineering for students interested in issues of Public Health. We envision engineering efforts increasing in emphasis within the SPH over time.

*Climate Change & Environmental Health (Specialization Track and Partnerships):* Scripps Institution of Oceanography - SIO is a unique resource within the UC System. As a School of Oceanography, it is ranked 4th in the world, and first nationally. SIO currently offers three undergraduate majors and three graduate programs that have great relevance to public health and that could be expanded and collaboratively merged as the SPH comes to fruition. These include environmental systems with an environmental health track, biosciences / marine biology (in collaboration with the SSPPS in Health Sciences. With a major interest in the health consequences of climate change and changing oceans, SIO is keenly interested in expanding its portfolio of collaborative environmental science and health programs. An important University of California report on this topic, *bending the Curve* and led by SIO faculty member, describes 10 scalable solutions for carbon neutrality and climate stability (Appendix I – Technical Papers and Reports). The impact of climate change on workplace conditions and workers is also important. Another example of a future specialization / concentration or degree would be to have students working under joint supervision of health scientists and climatologists. A required international practicum would facilitate UCSD students partnering with those from developing and developed countries, to help build strong global networks. We are planning to have an MPH concentration on “Climate and Health” with Health Science and SIO faculty.
**Mental Health and Addiction (Specialization Track and Partnerships):** Depression, anxiety, addictions, and other mental illnesses are leading causes of disability across the world. The opioid epidemic in the U.S. is a current threat of historic proportions. Partnering SPH with training opportunities in the School of Medicine’s Department of Psychiatry and UCSD’s Department of Psychology (Social Sciences) will create a broadening of public health educational opportunities for future SPH students. Also, faculty in the current FMPH department have great expertise in smoking prevention, including strong cross cultural expertise with ethnic groups in the US as well as global programs in China, epidemiology of global mental health in Jordan and Ecuador, mental health care services research, and integrative and alternative medicine in dealing with mental illnesses. Many Department of Psychiatry faculty have added expertise in addiction medicine, including tobacco, alcohol, marijuana, and opiates and even gambling and food addictions. Other faculty have expertise in traumatic stress, enabling rich ties with the military and law enforcement. Our Departments of Psychiatry and Psychology have wide-ranging partnerships within the community that can be leveraged to support SPH’s focus on mental health and addiction. Psychiatry has just one of two Community Psychiatry Fellowships in California and will be starting a new track in Community Psychiatry within its general psychiatry residency program (first of its kind in California). These programs are jointly funded by San Diego County, Community Based Organizations and UCSD. We are exploring expanding our medical partnership with Navy Medicine to include public health training. Currently Naval Residents, medical students and health corporate officers are cross-trained. The Department of Psychiatry leads global mental health systems training and implementation science projects, including with collaborations with the Implementation Research Institute, NIMH, and a Fogarty International Center in Johannesburg, South Africa. Psychiatry directs two International Addiction Technology Transfer Centers in South-East Asia and Ukraine. With these types of public health-relevant expertise and global connectivity at UCSD, an innovative Mental Health and Addiction program – initially as an MPH track, and eventually a PhD– could be focused on integrated mental public health, global mental health, health delivery, preventive and recovery-oriented treatment models, and population mental health care.

**Healthy Aging and Public Health (Specialization Track and Partnerships):** Another important area for the UCSD SPH is a focus on aging and public health. The population is graying all over the world. In the U.S., the number of people over age 65 will double from 46 million (15% of the population) today to 98 million (24%) in 2060. The fastest growing segment of the population is that of people over age 85. Escalating medical morbidity and disability with aging lead to social and economic challenges for the society as a whole. Yet, the gap between demand for, and supply of, experts in aging across different fields is widening. Within our proposed SPH, we will be able to train the next generation of public health professionals with expertise in understanding the impact of healthcare systems, workplace productivity, primary care, and social institutions, particularly as it relates to our aging population. Due to its inter-disciplinary and broad focus, an MPH program is an ideal educational venue in which graduates can apply specialized training in epidemiology, research methods and statistics, community engagement, and adaptive technology to create knowledge and solutions to support and improve aging. Collaboration among wide ranging professional perspectives from medicine, engineering, computer science, social sciences, and business can help redefine what it is to be part of the aging population in the U.S. Our SPH will be able to uniquely redefine the questions that we ask in the field of aging: How can we successfully shift the focus from pathology, to healthy living and successful aging. Trainees gaining knowledge from coursework in the SPH and from experts in the School of Medicine Stein Institute for Research on Aging can develop well-coordinated public policy aimed at targeted treatment and preventive measures for the world’s aging population. The Stein Institute has an exceptionally rich portfolio of training programs ranging from ones targeted to high school students, to postdoctoral fellows. It even educates the public through UC TV and YouTube. The JDP in clinical psychology between UCSD and SDSU can also interact with SPH. We would also foresee future joint degree programs between Psychiatry and Engineering, relevant to Healthy Aging, which would be of relevance to the SPH.

**Health Systems, Population Health, and Health Policy (Specialization Track and Partnerships):** Health Policy faculty in Health Sciences and across campus including those currently centered in the Departments of
Economics, GPS and the Rady School, are actively engaged in research efforts related to health care systems, health policy and health economics. Faculty interest areas range from the evaluation of interventions aimed at primary care and behavioral health practice transformation to the design and functioning of the state health exchanges under the Affordable Care Act. Faculty are active in the health policy community, both locally with ongoing programs with San Diego, Los Angeles, and Orange Counties and leadership in the San Diego Biomedical Science and Technology Policy Network, at the state level with ongoing programs supporting the California Legislature and the Mental Health Oversight and Accountability Commission, and nationally with participation in the implementation of the Affordable Care Act and leadership in the Agency for Healthcare Research and Quality. From the perspective of healthcare provider shortage issues, faculty members engage in work supported by the Office of Statewide Health Planning and Development. At present these are largely individual efforts without effective collaboration. The expanded collaboration facilitated by establishment of the SPH would strengthen and integrate a program in Health Policy and Health Systems, allowing for the offering of an MPH track as well as the potential for a future PhD combining the expertise offered by a broad number of faculty members on the UCSD campus.

**Women, Gender and Health (Specialization Track and Partnerships):** Many programs currently exist at UCSD, which combine to provide great depth and breadth for the study of Women Gender and Health. Faculty interests cover the lifespan, with strength in topics ranging from lactation (Department of Pediatrics), perinatal health (Departments of Bioengineering and Reproductive Medicine, among others), gender equity and health (Department of Medicine), and health across the lifespan (see Appendix E for discussion of these and other UCSD centers with foci relevant to Women, Gender and Health). Major focuses of this core would include those corresponding to the new Sustainable Development Goals (SDGs) for 2030, including reducing gender-based barriers to health, health care and autonomy regarding health decisions (e.g., use of contraception), as well as reducing all forms of gender-based violence against cis and trans gender women, girls and nonbinary gender people, including sexual assault, sex trafficking and child marriage, areas of research and practice on which UCSD faculty have established global leadership. With faculty from the Medicine, Social Sciences, Engineering, Pharmacy and Pharmaceutical Sciences, SIO, the field of Women, Gender and Health at UCSD is dynamic and cross-disciplinary. Graduate level elective coursework is already in place, with more planned for the recently approved MPH program. The combined resources of these centers and their faculty provide a foundation for the establishment of a broad based track in Women, Gender and Health within the MPH and in a future PhD program.

**Biostatistics and Public Health Data Science (Core Education and Partnerships):** The proposed SPH will foster new tracks in data sciences as they apply to Public Health. We anticipate adding a data science tracks within both the Biostatistics MS and MPH degree programs, aimed at public health professionals. This would be geared to physician-scientists and other health professionals, creating a uniquely attractive degree for those clinicians who are oriented to use of “big data” in their basic or translational research of practice. It is anticipated that the biostatistics courses in the current undergraduate Public Health major will be developed into an undergraduate Biostatistics major, a degree that is rapidly increasing in the US. A five year BA/MS program geared towards highly motivated students is planned. Across the Biostatistics educational programs, specialized instruction or tracks in areas such as streaming data inference, inference from electronic health record warehouses, design and inference for dissemination research or pragmatic clinical trials, and other areas can be developed.

**Ethics, Policy and Technology in Public Health (Cross-Cutting Theme and Partnerships):** In association with the Institute for Practical Ethics and the Tata Institute for Genomics and Society, the SPH will create new opportunities for education at the intersection of public health ethics, policy, history, and emerging technologies. Faculty across a range of schools, divisions, and departments at UCSD conduct independent scholarship in key areas relevant to these themes and will foster the training of future public health scientists/scholars, policy makers, and public health professionals who will be equipped to address old, current and new ethical challenges that arise in the science and practice of public health. Students will consider how social, cultural, and political context shapes ethical challenges in public health and options for
resolving them. Consistent with the foci of the Institute for Practical Ethics and the Tata Institute for Genomics and Society, the UCSD SPH will focus on ethical challenges related to emerging technologies in public health, which is consistent with the 21st Century vision of the school. In the past four decades technology has fundamentally altered our lives: from the way we work to how we conduct science, to how we communicate to how we fight wars. These technologies have not been without controversy, and many have sparked intense debates that are often polarized or embroiled in scientific ambiguities (e.g., discussions on genetically modified organisms). Individuals with this background will be able to provide local, national, and international service to policy-making bodies. They would be prepared to engage in ethical and policy analysis in governmental and nongovernmental organizations, and to be called on by think tanks, policy and advocacy groups, foundations, and international organizations to serve on ethics committees and governing bodies.

**Global Health Training (Specialization and Cross-Cutting Theme):** Global Health at UCSD is strong in the prevention of infectious disease, particularly in the areas of HIV/AIDS and tuberculosis. There are also multiple collaborative engagements in climate change and oceans and health with SIO, in global mental health, physical activity, tobacco control, water and sanitation (all in global settings), and global health policy. Health Sciences already offers a Global Health track within the JDP in Public Health. With this wealth of expertise, the development of a Global Health track in the MPH could readily be accomplished.

**Population Health Applied Genomics (part of Population Health Specialization and Partnerships):** UCSD School of Public Health will be in a unique position to provide specialized courses and programs with a focus on population health applied genomics. UCSD enjoys a distinct advantage of being a front leader in this discipline. The UCSD IGM Genomics Center, Moores Cancer Center, The Center of Epigenomics/Department of Cellular and Molecular Medicine, Center for Genetic Therapies at UCSD Health Sciences, UCSD Center for Computational Biology and Bioinformatics, UC San Diego Jacobs School of Engineering with a focus on bioengineering, UCSD Bioinformatics and Systems Biology, Rady Children’s Institute for Genomic Medicine offer extensive resources for integrating a course designed with population applied genomics as the highlight. San Diego has rapidly become a leading city in biotechnology with a strong emphasis on molecular biology, life sciences, digital health and information technologies. In addition to the academic centers within UCSD and its affiliates, there is also a robust presence of industry leaders in genomics including Illumina, Genentech, Thermo Fisher, and Human Longevity to name a few. The confluence of such technology and innovations creates a supportive and unmatched context for further advancing population health applied genomics. The availability of robust biostatistical and bioinformatics resources, development of bio repository, academic prominence juxtaposed with genomics technology leaders and various centers committed to excellence in Genomic Medicine makes this a natural area to expand.

**Interdisciplinary Health Sciences Training Collaborations / Dual Degrees**

**UCSD School of Medicine (Medical Students):** The UCSD School of Medicine has a long history of interdisciplinary education, including with SSPPS where Health Sciences medical students, pharmacy students, and graduate students enroll together in core preclinical and elective courses. There also is a longstanding history of interdisciplinary education activities between the School of Medicine and Jacobs School of Engineering with joint teaching service in the graduate level programs. We envision similar arrangements between the School of Medicine and SPH, and JSOE and SPH with students from each school able to take courses in the other and with courses being collaboratively taught jointly by School of Medicine, JSOE and SPH faculty. New educational tracks will be introduced that will give health care providers a technology foundation and in turn the engineering education in the JSOE will be complemented by introduction of engineering specialty tracks (at BS, MS, PhD level) (“Engineering for Public Health”). Examples of interdisciplinary courses currently offered in the School of Medicine curriculum and open to other students include, for example, Introduction to the Health Care System, Community Advocacy, Influences on Health: from Genes to Communities; An Introduction to Occupational Health; and the required Epidemiology, Biostatistics, and Medical Informatics (SOM 243) course (see Appendix C-VI for more
UCSD School of Medicine is part of a consortium consisting of 11 Schools of Architecture and SPHs chosen by the America Institute of Architects and the Robert Wood Johnson Foundation to study and facilitate the development of healthy environments. We are linked with San Diego's New School of Architecture, and having a SPH will strengthen our involvement in this program open to all students. Shared service agreements and best practice guidance are possible with the School of Medicine, such as registrar functions, financial aid, student wellness, and academic support and advising. An SPH will increase the pool of faculty to teach public health and core courses as well as provide teaching assistant experience to SPH graduate students and increase options for topics and faculty on required Independent Scholarly Projects. Similarly, faculty and clinical programs can provide fertile areas of training for public health students’ field work and practicum experiences. As an example, the UCSD School of Medicine Program in Medical Education – Health Equity (PRIME-HEq) is part of a UC system-wide effort to train physicians to better meet the needs of the diverse Californian population who are traditionally underserved by the medical system. PRIME-HEq has built many meaningful collaborations with community groups and health clinics related to medical underserved populations in San Diego, and SPH students and faculty could engage in these collaborations. UCSD Medical students, SDSU public health students, and students from the medical school in Baja California, Mexico, have travelled together with faculty to San Quentin, Mexico to perform public health outreach and provide medical care to a much underserved area. Such programs will serve as models for additional curricular offerings with our SPH.

A combined MD/MPH degree is of great interest at UCSD. Currently about 20-25 medical students per year (15-18% of each class) elect to pursue a Master degree between the third and fourth year of medical school in order to improve their preparedness to pursue careers related to population health or clinical research. The majority of these students currently enroll in Master of Public Health programs at other institutions, and many would prefer the opportunity to pursue these degrees at a UCSD so that their scholarly activities can leverage collaborations with UCSD faculty across the full continuum of their medical education, rather than solely during an isolated year away from UCSD.

**Skaggs School of Pharmacy and Pharmaceutical Sciences (Pharmacy Students).** Like the School of Medicine, SSPPS students also receive an interdisciplinary education. The steady-state enrollment is 240 PharmD students, 70 Ph.D. students and 30 pharmacy residents. Of note, 2nd year pharmacy students take courses with first year medical students that include foundations in human biology and organ system blocks (e.g. cardiovascular, pulmonary, gastrointestinal, renal, endocrine and reproductive systems as well as metabolism, microbiology, immunology and hematology). These courses are supplemented by "team-based learning" (TBL) sessions in which concepts are reinforced with students working together on case-based integrated applications. The integrated pharmacy-medical school curriculum, the TBLs, and required clerkship experiences, not only train students in critical thinking but in solving problems as teams with other pharmacy and medical professionals. This integrated model could be easily extended to SPH students. Other courses offered by the SSPPS, that may be particularly interesting to SPH students, include Introduction to Health Care Systems and Policy, Applied Pharmacoeconomics, Biostatistics (relevant to pharmacy and medicine), Law and Ethics, Pharmacogenomics, Special Topics in Psychiatry, and Concepts in Pharmacy Legislation. SSPPS students are required to conduct research projects prior to graduation. Examples of research conducted by SSPPS clinical faculty include Pharmacoeconomics and Outcomes Research; Post-Acute Care Outcomes, Adherence and Health Disparities Research; Psychiatry; Burnout and Suicide Prevention; Pharmacogenomics; and Pharmacogenomics Education; and Medication Safety and Addiction. Students will be exposed to research and training opportunities in the 3 public health oriented centers described in the research section, including on neglected tropical diseases, emerging epidemic of antibiotic resistance, and the Oceans and Health / H2O Center. Opportunities exist for basic research in infectious diseases (neglected tropical diseases, Zika, HIV, antibiotic resistance and new methods to combat pathogenic bacteria. With a School of Public Health in place, projects could also involve pharmacy students working collaboratively with faculty between SSPPS and SPH.
Dual degree programs can also be envisioned between the SSPPS and the SPH. In addition to the PharmD, the SSPPS currently supports a joint PharmD/PhD program, a seven year BS Chemistry/PharmD degree and a newly established Master's degree in Drug Development and Commercialization. The PharmD/PhD program is particularly noteworthy as an example of the SSPPS collaborative spirit with other campus departments/programs/schools. These students conduct two years of pharmacy school, then complete a 3 year PhD, typically within the framework of the highly regarded Biomedical Sciences (BMS) umbrella program that involves faculty in School of Medicine, SSPPS, Chemistry and Bioengineering, and then they return for the last two years of the PharmD. Certainly School of Medicine and SSPPS integrative educational endeavors are templates for establishing similar collaborative within SPH.

**Student Demand and How the School will Attract Highly Qualified Students**

There is high demand (see below for details) for our existing educational programs of the Bachelor of Science in Public Health, JDP in Public Health, PhD in Biostatistics, and Master of Advanced Studies in the Leadership of Healthcare Organizations. For our future programs (approved MPH, pending MA Biostatistics, and another PhD in future), we have every reason to believe that we will be successfully competing for outstanding high-quality students. The target size of these degree programs is relatively modest for the type of programs, and we anticipate high interest from graduates from our own UCSD BSPH, UCSD medical students and other joint degree programs, and highly qualified faculty within Health Sciences who will undoubtedly exceed the number of proposed available positions. In the information below, we provide more details on the recruitment to date from our currently approved and functioning programs and future programs. UCLA and UCB also have high demand for admissions to their SPH programs and are unable to accept all the excellent candidates who apply.

**Demand for Current Public Health Programs (to migrate to the new SPH):**

**Bachelor of Science in Public Health:** We now have over 600 UCSD students in this major with over 2000 students taking at least one course. We are currently unable to accommodate all the UCSD students who want to be in the BSPH major. The major is very popular despite the recognition that the BSPH is a rigorous program (about 55% of students’ report that BSPH classes are more difficult than other UCSD courses). In Fall 2015, the BSPH began requiring students to complete the Introduction to Public Health course with a grade of B or better prior to being admitted as a Public Health major. About 33% of our 150 yearly graduates are pursuing a MPH degree and we are confident in retaining outstanding students to our new MPH program.

**JDP in Public Health:** Our JDP program typically receives 75 to 90 applications each year for the 4 to 6 student openings in each of three tracks. The JDP attracts talented U.S. and internationally trained students who typically enter our program with Master’s-level degrees and a depth of experience in public health research. Among 46 current JDP students (2016-2017), 65% already had more than one peer reviewed publication (PubMed) and those 46 published 218 publications in high impact journals such as JAMA, Lancet, Tobacco Control, International Journal of Epidemiology, and the American Journal of Public Health. Being a SPH will further strengthen the caliber and reputation of this program.

**PhD in Biostatistics:** For Fall 2016 we received 80 applications and admitted 4 students; for our second year (Fall 2017) we received 108 applications and admitted 5; in the third year 110 applications were received with 5 admissions anticipated. The applicant pool was well-qualified with very strong analytical skills: median GPA=3.78, median quantitative GRE: 93%; median verbal GRE: 95%. Applicants had received Bachelor’s or Master’s degrees from internationally renowned universities including Johns Hopkins University, Duke University, University of Wisconsin, University of Michigan, and University of California (Berkeley, Los Angeles). We attribute this auspicious launch to the outstanding opportunities at UCSD for collaborative statistical research in biomedical sciences, to the unique cross-disciplinary and rigorous training of the program (mathematics, computer science, biostatistics), and to the outstanding job market at state and national and international levels in this profession.
Master of Advanced Studies in the Leadership of Healthcare Organizations for part-time professional career advancement: Since 2001, the MAS-LHCO program for working professionals has experienced consistent enrollment. The program averages 30 - 40 active students at any time, with 10 to 15 graduates per year, and 121 total graduates to date. The professional backgrounds of the students reflect a balance between healthcare administration and clinicians, including physicians, nurses, dentists, and physical therapists. Most students entering the program are at the mid-level in their healthcare careers and view the degree as a means to strengthen their chances for promotion. For example, the incoming Fall 2017 class embodies an impressive range of professional and academic backgrounds including physicians, a pharmacist, nurses, and a director of strategy in a healthcare organization. This diversity fosters a dynamic and exciting atmosphere in the classroom, a key aspect on which many students comment. Organizations employing the MAS students are diverse in their size and specialization and include hospitals, those in the pharmaceutical, biotechnology, medical device, and even insurance firms, private physician practices, and allied health organizations.

Anticipated Demand For Future Public Health Programs:

Master of Public Health: Set to launch in Fall 2018, we are confident of attracting high quality and diverse applicants to the MPH program. As of April 20th this year, the MPH has 97 completed applications, 54 offers of admission, and 19 accepted students with the admission process still underway. The MPH will focus on recruiting some of our most talented graduates of the BSPH for further study, and also identify top Bachelor’s degree graduates from standard admission practices. In addition the MPH program will also aim to train medical students, pharmacy students, physicians, and other health professionals in public health sciences to complement traditional health care training. This is particularly relevant as we are aware that each year approximately 7 to 12 students from our School of Medicine seek MPH training at programs outside of UCSD, typically those offered by Harvard, Johns Hopkins, UCLA or UC Berkeley. A survey of our Family Medicine residents yielded 8 respondents who were “very interested” in attending an MPH program. UCSD Pharmacy students represent another potential applicant pool. We will not rely disproportionately on local applicants, but there is clear potential for a strong applicant base from local sources. In addition, we anticipate that individuals possessing an advanced degree in a health-related field, e.g. MD, PhD, PharmD, MSN, and DNP/NP, with appropriate background coursework and/or professional experience in public health, will also have interest in pursuing an MPH. Nurse leadership is a wide ranging and important aspect of healthcare. There are opportunities to target nurse administrators and leaders given the interface with our UCSD Health system and population health orientation. Many faculty members interested in NIH K series and other Career Development Awards are interested in including the MPH in their training plan.

MS in Biostatistics (Proposed): The Master’s program is currently under campus review, and is expected to start in Fall 2019, with cohort sizes of 30 per year. Given the exceptional quality of applicants for our PhD in Biostatistics, we anticipate a similarly well qualified pool of applicants from which to choose for the MS program. There appears to be a strong job market for this degree, locally and nationally. The proposal for this program has been approved by the Divisional Senate, and is on the November CCGA agenda.

Commitment to Diversity, Equity, and Inclusion of the Students and Faculty

Enhancing and Supporting Diversity Plan: A new SPH presents an opportunity to make diversity a priority for new programs and initiatives, to engrain inclusiveness and equity in the culture, and to rethink how diversity is achieved in existing activities. Diversity, equity, and inclusion derives from the professional values, ethics, and essential functions of a SPH. As an a priori focus on ensuring a diverse faculty, staff, and student body, we will establish diversity and inclusion as a central priority for the core functioning of the SPH. Our faculty leaders already work closely with the UCSD Vice Chancellor for Equity, Diversity, and Inclusion and the Office of Equity, Diversity, and Inclusion to support positive and productive relationships amongst individuals of diverse perspectives in order to create a culture and environment that is both open and
inclusive. Mutual respect and cross-cultural collaboration is necessary, and the SPH will assure that students and faculty are aware of the UCSD resources and the SPH will develop additional needed resources. In addition to recruitment, we know how important support is required for retention of underrepresented / underserved populations. Part of the ongoing education for all will be to deepen understanding and challenge misconceptions surrounding diversity, including addressing micro-aggressions. SPH leaders will be advocates for establishing diversity, inclusion and equity.

A central challenge in public health is reducing the large disparities in health outcomes between the advantaged and the disadvantaged – in the United States men in the top 1% of the income distribution live 15 years longer than men in the bottom 1%.

2 The effects of climate change will almost certainly exacerbate disparities, both within the US and globally. Innovative new technologies have the potential to further exacerbate disparities, as the rich and often benefit from these technologies much more than the poor. The SPH will catalyze interdisciplinary work on reducing disparities, in which traditional public health faculty conduct research with colleagues in climate science, engineering, and the social sciences focused on how to improve the public’s health, which, inevitably, focuses on improving health outcomes for the disadvantaged. The central challenge faced in public health creates an environment in which diversity in students, faculty, and research is supported and encouraged.

Diversity in faculty, students, and research populations is an essential element of outstanding public health practice and research. As described below, students in the undergraduate BSPH and the entering class of the MPH program are significantly more likely to be from underrepresented minorities than UCSD students as a whole. Similarly, the public health faculty in the Department of Family Medicine and Public Health and working in Global Health in the Division of Infectious Disease in the Department of Medicine are much more likely to members of underrepresented minorities than other faculty at UCSD. Our commitment to diversity in faculty and student recruitment is simultaneously a commitment to diversity of perspective, a greater propensity to engage in research of benefit to underserved communities, and a commitment to excellence. We seek a culture of diversity and inclusion within the SPH fabric which includes education, support, mentoring, recruitment / retention, asking faculty at their annual evaluation how have they supported diversity (hiring, mentoring, teaching, research, service, etc.), and assessing student/faculty experience related to diversity.

Examples of efforts to increase diversity of students and faculty will include: 1) partnership with local elementary, middle, and high schools to introduce public health concepts early in life and develop a relationship of trust and respect with UCSD; 2) partnership with historically black colleges and universities during college years for mentoring and training such that UCSD is an attractive option for graduate and postdoctoral training in public health; 3) San Diego Summer Training Academy for Research Success (STARS) program, and 4) recruitment and retention of under-represented faculty by creating an environment of inclusiveness in hiring, mentoring, and evaluation processes. We are committed to innovations in our diversity efforts and will pursue the creation of a learning laboratory in public health devoted to the training of individuals from underrepresented groups.

**Student Diversity:** We will have a diverse student body with support and attention to diversity in our educational programs, curriculum, practicums, and faculty. An example is the success in admitting a diverse BSPH student population, which is more diverse than the UCSD undergraduate population as a whole. BSPH majors are more likely to be from under-represented minority groups: approximately 25% are Latino and an additional 5% are African-American. In comparison, for the overall UCSD undergraduate population, the corresponding values are 16% Latino and 2% African-American, respectively. BSPH majors are also more likely to be first-generation college students (44% versus 35% overall on the UCSD campus) and to have family incomes <$52,000 per year (48% versus 37%). A total of 14% of the BSPH majors met all three criteria of being from an underserved minority group, being a first generation college student, and having a

family income <$52,000 per year, while 70% met at least 1 of the 3 [Comparable figures are not available for UCSD]. The current MPH applicant pool is similar to the BSPH population and has about 80% female and 80% non-white. As another example, the Public Health - Integrated Cardiology fellowship program has aggressively sought funding from Diversity Supplements with 5 of 16 fellows coming from underrepresented groups.

Faculty Diversity: We have and will be committed to recruiting and retaining a diverse faculty as exemplified by the core group of current PH faculty. Of the 67 current public health faculty in the department of FMPH, approximately 18% are underrepresented minorities, including African American, Latino or Native American. Of the global public health faculty in the Department of Medicine, 35.3% are underrepresented minorities. This compares with a diversity component of 7% among faculty from these groups at the SOM and across the campus as a whole. We are committed to diversity, inclusion, and equity for the SPH faculty.

Research on Diversity: With respect to research populations and research questions, the public health faculty have included a focus on diversity locally and globally. Participatory research includes going into the communities and engaging them in the process of the research, engaging them in establishing some of the priorities for the research, and ensuring the research is applied to benefit the community. Some faculty are heavily engaged in work related to health risk and modifying health-related behaviors of underrepresented groups. Some are developing interventions that targets diverse populations at risk for prevention and early intervention. One example, The Center of Excellence for Health Promotion and Equity brings together 47 faculty members from across the Departments of FMPH, Medicine and Pediatrics who are involved in research that will contribute to the elimination of health disparities among underserved populations. One faculty member is lead investigator of the UCSD/SDSU Cancer Center Comprehensive Partnership, one of only 12 programs funded through NCI’s Comprehensive Partnerships for the Advancement of Health Equity, a collaborative program aimed at reducing the burden of cancer among Hispanics/Latinos in San Diego and Imperial counties through research and community outreach. Many faculty study diversity in their research and are contributing to the elimination of health disparities among underserved populations.

Plan for Achieving Rigor within the School of Public Health

The high quality of our public health and partner cross-disciplinary faculty at UCSD is the foundation for excellence in our education and research programs, allowing us to recruit highly qualified students, enhance our national stature, and achieve accreditation within the minimum timeline mandated by the CEPH, the organization responsible for accreditation of schools of public health [see the prior section and Appendix C for a thorough review of student demand and qualifications, and program requirements]. We have demonstrated excellence in academic rigor amongst our faculty members in our current public health programs based on the outstanding students, excellent evaluations, well-funded research programs / scholarly work, and early collaborations across the campus; however an SPH is needed for UCSD to bring together fragmented programs and accelerate our vision for achieving world-class rigor in public health.

Accreditation Plan and Timeline: We plan to apply for CEPH accreditation in 2023. In addition to our current program offerings, CEPH requires that we develop a third concentration in the MPH, and an additional doctoral program. The MPH is currently offering concentrations in Epidemiology and Health Behavior, and is submitting a proposal in October 2018 for a General Public Health Concentration targeting medical trainees. Working groups of faculty, primarily from FMPH, but also including faculty from Psychiatry, Engineering, the Design Lab, and SIO are developing proposals for additional concentrations, focusing on mental health, public health ethics, climate and health, environmental health, and data science. We plan on offering a third concentration by 2019 and two additional concentrations by fall 2021. We are working on development of a proposal for an additional Ph.D. We are well positioned to start doctoral programs because of the breadth and depth of research faculty who have expressed strong interest in affiliations with the new SPH. Each of the thematic areas identified as important to the school in this proposal have the potential to be turned into strong doctoral programs. The development of MPH
concentrations in areas such as climate and health, data science, engineering and public health, population health, and mental health and public health, will lay the groundwork for possible doctoral programs in these areas. We expect that the additional doctoral program will be a small program that leverages much of the existing curriculum in the Public Health doctoral program as well as in the SIO, Bioengineering, and across campus. The program will receive the standard block grant, and students will be supported by TAships and GSR/research funding with the potential for a T32 training grant. Our goal is to submit a proposal for the new doctoral program by Spring, 2020, with the first students enrolling in the Fall of 2022. That timeline would allow us to submit our School of Public Health application for accreditation by Fall 2023, which is five years after the matriculation of our first MPH students, and the earliest date that CEPH will allow an application.

**Plan for Assessing Programs on a Regular Basis:** As part of the continuing, critical analyses of academic programs and student learning at UCSD, the Academic Senate performs scheduled program reviews to ensure superior educational quality throughout the campus. Formal graduate program reviews are conducted under the direction of the Office of Graduate Division Dean on an eight-year cycle for each department or graduate program (the undergraduate program reviews are typically scheduled one year after the graduate reviews). The Graduate Council of the Academic Senate makes recommendations to system wide Senate for the establishment of new graduate programs; approves changes to existing graduate programs; approves proposals for new graduate courses and changes to existing graduate courses; conducts regular reviews of current graduate programs; makes recommendations to the Dean of the Graduate Division regarding distribution of graduate student fellowship funds; and approves text describing graduate programs, schools and colleges in publications.

At the undergraduate level, the Senate Committee on Undergraduate Council (UGC) is responsible for conducting these periodic reviews, which cover all undergraduate academic programs. The Dean of Undergraduate Education (DUE) works with UGC to facilitate undergraduate program reviews, in a manner analogous to the relationship between the Dean of Graduate Division and the Graduate Council for graduate program reviews.

**Creating Synergy and Coherence Across SPH Academic Programs**

Faculty and staff in FMPH engage in substantial coordination among the various degree programs that will be in the SPH. This coordination is focused on creating synergies among the programs, and assuring coherence in the educational offerings. Examples of the activities and projects in this work:

- Coordinators and student advisers for the various educational programs sit in the same space, to facilitate cooperation.
- The educational program coordinators meet regularly to facilitate sharing of knowledge, best practices, and develop synergistic strategies. Further, they cross-cover for each other across programs. An example of integration already in place is the close coordination between programs in that both PhD programs provide TAs for the BSPH and MPH and it is expected that some MPH students may also TA in the BSPH.
- We have created an integrated website https://ph.ucsd.edu/ where all public health programs will be featured.
- We are creating a dynamic database linking student, faculty, alumni, and program-specific data, to help directors, coordinators and school leadership with accreditation efforts and planning. A prototype of the database has been created, and we're in the process of creating the full version using Tableau as a platform.
- All FMPH education program directors meet annually as part of an Education Leaders retreat (this includes public health programs and residency programs).
• Best practices and rubrics for JDP admissions meetings were shared with the MPH admissions committee and the MPH committee adapted those materials when developing the MPH-specific admission rubrics.

• The public health program directors meet monthly as part of the FMPH Education Committee. One of the agenda items for this group has been consideration of which JDP classes might be open to MPH students (and vice versa), and similarly, consideration of crossover classes for the LHCO and Biostatistics programs. Some JDP students have already taken some PhD Biostatistics courses, and we expect additional synergies across programs as the Biostatistics MS program is initiated, the MPH program grows, and the LHCO program is more closely integrated with other programs in the new SPH. Further, the Vice Chair for Education has convened instructor-level meetings to ensure that the curriculum is appropriate at various levels (for example, assuring that the Biostatistics course in the MPH builds on the Biostatistics course in the BSPH).

Many of the educational programs that will be housed in the proposed SPH are new – the MPH accepted matriculated its first students in Fall, 2018, the third cohort of Ph.D. students in Biostatistics entered in Fall, 2018, and the MS in Biostatistics, if approved at the November, 2018 meeting of the CCGA, will matriculate its first class in Fall, 2019. As these programs grow and mature, we will work at assuring coherence and synergy.

How UC San Diego’s School of Public Health Will Become a Top-Ranked School of Public Health

The goal of the SPH is to develop into a top-5 ranked school of public health nationally within its first ten years. The combination of a strong foundation of core faculty in Public Health and Global Public Health with strong educational and research programs at the outset, combined with the stellar quality of our campus-wide partners, will enable us to achieve excellence in traditional areas as well as to excel at emerging areas necessary for a 21st century school of public health.

We are realistic in our goals, understanding that we will leverage existing resources in a new way which will require close collaboration and partnerships across the campus to create the type of clustering of excellence we have seen in other UCSD institutions, institutes, centers, divisions, and schools. Only through new philanthropy and new collaborative grants and contracts will be able to achieve resources that are of the scale and scope of the Bloomberg School of Public Health at Johns Hopkins or the T.H. Chan School of Public Health at Harvard; however, the quality of our faculty and programs within the specific areas we have carved out for focus will distinguish us as one of the top ten schools in the country for innovative programs addressing public health.

The SPH will be unique in its approach to population-based health by engaging with local and state organizations to create outcomes based capstone projects that can have immediate impact in the field. Focus on information technology to serve the needs of the medical and policy community will be emphasized to help achieve the quadruple aim of healthcare of improved health for the population, better care for the individuals, lower health care costs through improvement, and care of the provider by reducing burnout and improving engagement. With the active expansion and growth of UC San Diego Health, SPH students will obtain real life experience in the evolution of our health delivery system. They will apply classroom learning to disruptive models of care being developed at UCSD and have the opportunity to learn about new modes of healthcare financing through courses offered in tandem with the Rady School of Management.

By embracing our role as the premiere academic institution in San Diego, the County itself can serve as a classroom for our students. With UCSD’s close relationship with Veterans Affairs Health Care and Military Medicine, there are opportunities for these local partnerships to expand to have national and global health emphases, particularly given the scope of these organizations and aligned problems in mental health,
addition, population health, and the Navy’s leadership and need for engagement in climate change and related emergency public health initiatives, including partnerships with the Red Cross and other groups.

We have described five core 21st Century public health issues strengths and our open and interdisciplinary way of engaging, which we believe will help quickly distinguish us from other SPHs: Climate Change and the Environment; Population Health and Disease; Mental Health and Addictions; Healthy Aging and Longevity Science; and Women, Gender and Health. These core areas of emphasis are represented by just a handful of other SPHs in the United States. We will have tremendous strengths in both research and education. Our PhD in Biostatistics provides an excellent example of our successful strategy in developing top ranked programs and the need to become an SPH to become a top ranked school. Given the talents of our Biostatistics and Mathematics program faculty members, and the exceptionally rich research environment across UCSD, this new program is on track to grow into a leading Biostatistics graduate program within the next 5 years. We anticipate that our strategic direction and excellence of our partners across campus will combine to support our rapid ascendance in national rankings of schools of public health.

Employment Opportunities for School of Public Health Trainees

All of our programs are in areas of demonstrated need, and graduates of current programs have thus far succeeded with their chosen “next steps,” whether in further education, professional or academic work. We will pay close attention to evolving training needs and anticipate that graduates will continue to prosper following graduation with a knowledge base and skill set that equip them to meet future needs.

BSPH: About 70% of BSPH graduates who responded to our exit survey in spring 2017 indicate acceptance to graduate school, or an intention to secure a graduate degree, primarily focused on health-related disciplines including MPH, Masters of Science in Nursing, MD, and Masters of Hospital Administration. Those who have chosen to enter the job market rather than going on immediately to graduate school report a variety of positions, nearly all of which are health related. A sampling of job choices includes public health research, healthcare administration, health behavior/community health, environmental and occupational health, and ancillary health positions (e.g. medical assistant and Emergency Medical Technician).

MPH: We will not accept our first class of students until September 2018, yet previously documented local, statewide and national need for Public Health professionals, combined with the success of our BSPH graduates, leads us to expect that graduates will encounter success in the job market should they choose to pursue professional opportunities rather than continue on to doctoral study. The small size of our MPH cohort, in addition to the focus on contemporary needs in the field, bolster our expectation that graduates will be rewarded in the job market.

JDP: The effectiveness of our program is reflected in the success of our alumni. Located in 58 cities within 8 countries around the world our alumni are employed in academic (61%), government (15%), non-profit (9%) or other (15%) industry and consulting positions with 60% remaining in California, 31% relocating to other US states and 9% employed internationally. Recent graduates have acquired competitive post-doctoral fellowships at top programs including Stanford, Harvard, Columbia, Yale, and the National Cancer Institute. The JDP prepares today’s students for tomorrow’s public health needs and links graduates to our multidisciplinary network providing public health leadership internationally.

PhD (Active) and MS in Biostatistics (Proposed): New problems in data management, data integration and data analysis (“data science”) have grown rapidly along with advances in science and technology. As previously documented, the biomedical sciences have a critical shortage of data scientists with a combination of quantitative expertise, collaborative skills, and life-sciences training both at the master’s and doctoral levels. Biostatisticians are in high demand for positions in academic biomedical centers, in government agencies, and in the pharmaceutical and biotech industries. They are needed for developing both theoretical and applied methodologies, particularly in such newer areas as “omics,” sensor based streaming data, and image analysis, but also for complex problems in more traditional areas of epidemiology, health policy, and
clinical and translational research. We therefore anticipate that both our PhD and MS graduates will be welcome in the job market at local, statewide and national levels.

**MAS-LHCO:** In our MAS-LHCO program for working professionals, students attend part-time while working in the San Diego healthcare industry. Most students entering the program are at the mid-level in their healthcare careers and view the degree as a means to strengthen their chances for promotion in their current position or to move to a higher level with another employer in the industry. The outcome of our recent MAS-LHCO five year review was positive, reflecting the program’s success in providing mid-career students with the necessary educational skillset to take the next steps in their careers, with data showing that 35% of our graduates changed careers within two years of graduation, with 33% rising to Executive and Senior Management positions.

**RESEARCH AT THE SCHOOL OF PUBLIC HEALTH**

**Research Environment at UC San Diego**

UCSD has an accomplished campus research environment recognized worldwide. In September 2017 The Times Higher Education named UCSD the fifth best public university in the world. That announcement followed the Academic Ranking of World Universities, which placed UC San Diego fourth among US public universities on the strength of its research achievements, and another in the journal *Nature*, which ranked UCSD the world’s 14th best university for research activities that create products or services that benefit society and spur economic growth. Faculty from UCSD includes 5 Nobel Laureates, 87 National Academy of Science (NAS) members, 65 National Academy of Medicine (NAM) members, 35 National Academy of Engineering (NAE) members, and 8 winners of the National Medal of Science.

As illustration of the research depth at UCSD, for the fiscal year ending June 2017, UCSD garnered $1.16 billion in total research support making us the fifth largest federally funded research program in the nation. Within UCSD Health Sciences, the NIH ranks UCSD School of Medicine faculty 8th in overall and 4th in per-faculty-member federal research funding. This is remarkable since the medical school was established at UCSD only 50 years ago (1968). It now comprises more than 1,600 physicians and scientists in 18 academic departments. As was inherent in the initial plans for the School of Medicine, many of its departments apply a structure that strengthens interactions of basic and translational researchers, fostering a healthy “bench to bedside and back” flow of information.

UCSD is embedded in a scientifically rich, and tremendously collaborative local environment that fosters interdisciplinary research. The compact physical nature of the campus and its current divisions and schools – Arts & Humanities; Biological Sciences; GPS; JSOE; Rady School of Management; Physical Sciences; Social Sciences; as well as UC San Diego Health Sciences with the Schools of Medicine and SSPPS – provides a solid foundation for collaboration. In addition, more than 30 Organized Research Units (ORUs) – each with a thematic interest such as the Moores Cancer Center or the Climate Change Center, Center for Marine Biotechnology and Biomedicine - provide scientific and administrative infrastructure to support interests from across the entire campus and even the local region.

UCSD benefits greatly from its close ties to many internationally distinguished research institutes in close proximity to campus, including the Sanford Consortium for Regenerative Medicine, the Salk Institute, The Scripps Research Institute, the Sanford-Burnham-Prebys Institute, the La Jolla Institute for Allergy & Immunology, Scripps Translational Science Institute, and the J. Craig Venter Institute. Further benefits accrue from a vibrant local biotechnology industry including the sizable campuses of Pfizer, Qualcomm, and over 350 start-up enterprises – many of which were founded by UCSD researchers.

Putting all of this in context is the 2012 Jones Lang LaSalle ranking which ranked San Diego as the second largest life-sciences cluster in the US. The university’s faculty and alumni have founded more than 200 local companies, comprising more than one-third of the region’s biotech companies and more than 40% of the San
Diego biotechnology industry workforce. Thus, UCSD’s research enterprise is clearly making remarkable contributions to science, the public well-being, and the local economy. These strong and diverse research resources, and the wide scientific reach they represent, provide a foundation for a truly unique SPH with impact that will benefit the campus, region, CA and beyond.

UCSD’s uniquely collaborative setting will provide the foundation for strategic growth in public health research when a School of Public Health is formed on our campus. Here we provide just a sampling of the breadth and depth of many of the current public health research efforts in place at UCSD.

**Current Core Public Health Research within UC San Diego Health Science**

**Faculty in Health Sciences will form the core of public health researchers supporting the proposed School of Public Health:** The core public health research efforts of the proposed SPH will be formed by the approximate 100 faculty from UC San Diego Health Sciences based currently in the Department of FMPH and the Department of Medicine, Division of Infectious Disease and Global Public Health. These faculty members will have the option to have a primary appointment in the SPH or remain in the School of Medicine with the potential of a secondary appointment in the SPH. Combined, this group of faculty is currently supported by 30 state-funded FTEs and has a robust $160,000,000 total direct cost grants and contracts portfolio (FMPH Department and Division of Infectious diseases and Global Public Health in the Department of Medicine) of extramurally funded research grants and contracts. The projects pursued by these investigators span a wide range of topics across Behavioral Medicine, Biostatistics and Data Science, Epidemiology, Global Health, Health Policy, Mobile Technologies and Health, Preventive Medicine, and Research Ethics. Their work addresses important questions with innovative techniques and leads to seminal publications in the most prestigious journals of their respective fields. With formation of an SPH, there is no doubt that additional core and collaborative research efforts will be formed to further enhance this portfolio.

**Specific Public Health Research Programs in Health Sciences**

**Behavioral Medicine:** Faculty members develop interventions targeting physical activity and diet, including adherence to and maintenance of improved behaviors. Many are internationally known for efforts in both Active Living Research, the science of the relationships between physical activity and the built and natural environments, and for the use of mobile and wearable technology to measure and promote physical activity. Other topics are behavioral interventions targeting healthy eating behaviors; interpersonal influences on weight-related behaviors; individual- and population-based approaches to smoking cessation; effects of social norms on smoking behavior; integrative health interventions for chronic pain and cardiovascular diseases; and research ethics. Other areas of strength include identifying factors that promote healthy aging and exceptional longevity, and preserving bone health, cognition and physical function, and independence in the very old.

**Biostatistics** Health Sciences has biostatistics expertise which encompasses state-of-the-art statistical, mathematical and computational methods, combined with a deep understanding of the scientific questions and issues of a given biomedical domain. Research interests of biostatistics faculty spreads across work in the UCSD School of Medicine and the general campus, with strong ties in the Departments of Mathematics and with Computer Science and Engineering, and Electrical and Computer Engineering. Biostatistics is vital in the conduct of UCSD’s wide ranging clinical trials, observational studies, biological experiments and clinical trials. Having significant mathematical depth (7 biostatistics faculty have training in pure mathematics or in statistics), these faculty engage in developing methods in a variety of emerging, translational biomedical and Public Health research spaces. Studies involve genomics, metabolomics, computational chemistry, cell biology, image analysis and also in climate science, behavioral epidemiology, psychiatry, large cohort studies, drug discovery and therapeutic clinical trials. Technical expertise includes analysis of streaming sensor data, RNA, DNA, and epigenomic profiles, proteomic and metabolomics spectra, image collections, very large scale electronic health record repositories, cheminformatics data repositories and social network streams, as well as more traditional domains of laboratory experiments and
human subjects research. Some examples of biostatistics collaborations include: applications of probabilistic random field theory to climate change (with SIO); ascertainment of the effectiveness of colonoscopy screening by mining the VA electronic health record (with the Department of Medicine), and the development of Bayesian network graphs using simultaneously collected accelerometer, inclinometer and sense-cam data to investigate the interactions between sleep, sedentary behavior, and physical activity with metabolic health, cardiovascular disease and cancer (with the Department of Mathematics).

**Climate and Public Health:** Given the importance of climate change and public health, and the unique resources that SIO provides, we have already embarked on the sort of collaboration that we envision for the SPH. Two faculty have been recently recruited and appointed jointly in Health Sciences and SIO; we would anticipate more joint hires and collaborative efforts with in this area. Work of one faculty focuses on how climate and weather impact vulnerable urban subpopulations, such as children and elderly people, and whether the effects differ by socioeconomic status. Collaborations with this faculty from SIO/UCSD, with health sciences and bioengineering at UCSD include a project to measure vital signs among school children on playgrounds during heat waves. In addition, climate change impacts workplace conditions, workers’ health, and productivity, and economies. The other jointly appointed faculty combines expertise in epidemiology study design and health risk assessment, with climate and econometric models, to inform health policy. SIO’s research on air/sea interactions has impacts for human health in the coastal zone (particularly from sewage spills and harmful algal blooms, etc.), research on climate and primary health care delivery, and research on chemicals and pollutants like plastics and other refuse in the ocean evaluates their impacts on the food supply. We will continue to build on these first initiatives in developing a world-class program in Climate and Public Health.

**Epidemiology:** UCSD conducts studies and prevention trials that have had a major worldwide impact in identifying important risk factors and preventive treatments for common health problems. For example, UCSD is home to the Rancho Bernardo Study (RBS) the longest continuously running NIH-funded program in the United States that is now in its 42nd year with 1,600 participants still under surveillance. RBS has produced 420 peer-reviewed papers on a wide range of topics including heart disease, diabetes, hypertension, osteoporosis, memory loss, and arthritis, amongst others. UCSD researchers also have longstanding involvement and local participants in the Women’s Health Initiative, ABCD, STARRS, SAGE, Community of Mine, CARDIA, MESA, the Study of Latinos (SOL), the Diabetes Prevention Trial Observational Study, and the Study of Osteoporosis in Men. Epidemiology faculty currently focus on behavioral risk factors for chronic disease; women’s health and sex/gender differences; healthy aging and longevity; cancer epidemiology; cardiovascular epidemiology; infectious epidemiology; genetic epidemiology; health disparities and vulnerable populations; environmental and climate change epidemiology; and epidemiologic methods. One faculty member conducts gene-environment interaction studies using data on more than 200,000 participants from the US resource dbGAP in relation to renal and cardiovascular disease and diabetes complications. UCSD’s ACTRI includes two of Public Health’s Epidemiology faculty as Director and co-Director of The Center for Life Course Research. The Center is the first of its kind at UCSD that brings pediatricians, neonatologists, internists, family medicine physicians and geriatrics specialists together to study broad patient populations and life course transitions.

**Gender Equity and Health:** UCSD faculty members are leading global scholars and authorities on issues of gender equity and health, seeking to understand how improvements in gender equality and empowerment can be key drivers of reducing health disparities for women and girls globally. Such improvements are central to multiple global development goals, as described in the recently ratified Sustainable Development Goals for 2030. The study of gender equity and health (GEH) combines important perspectives from human rights, international development, medicine and behavioral science to inform development of effective and sustainable solutions to interrelated health, social and economic concerns that currently impede the health of populations globally. Current GEH research at UCSD includes studies to understand and reduce multiple forms of, gender-based violence (e.g., partner violence, sexual assault, sex trafficking, and reproductive coercion), including violence against transgender and gender nonbinary people. This research utilizes cutting
edge methods in the areas of social norms and social networks, mathematical modeling, and implementation science, many developed by UCSD researchers. Most all current GEH research include partner organizations with the highest levels of influence to create lasting change at population levels (e.g., Bill and Melinda Gates Foundation, World Health Organization, Ministries of Health from multiple nations), maximizing the impact of knowledge generated at UCSD to change policies and improve lives in sustainable ways. Specific current studies include the public health impact of early and child marriage, sexual violence against children, sex trafficking, intimate partner violence and sexual assault, and reproductive coercion. UCSD faculty are also conducting rigorous evaluation trials in more than a dozen nations to understand the effects of novel and sustainable programs and policies to reduce HIV infection, adolescent and unplanned pregnancies, and maternal and neonatal morbidity and mortality via empowering women and girls, engaging men and boys, changing broad social norms, and implementing feasible and sustainable changes to health systems.

**Global Health Research:** Many faculty pursue Global Health Research with research in at least 15 countries, including: Mozambique, Ethiopia, Uganda, Kenya, South Africa, Ecuador, Brazil, Peru, India, China, Jordan, Guatemala, the Ukraine, Iraq, Somalia, and Mexico. Key studies include work along the US/Mexico border, as well as among migrant populations in the US. Increasing emphasis is being placed on environmental health in the face of climate change and limited water, agricultural, and energy resources. Global Health faculty are pursuing research also on physical activity, tobacco control, water and sanitation, all in global settings. Another initiative involves community outreach as part of UCSD’s Superfund Research Project, to generate new perspectives on the molecular and genetic basis of the biological effects of toxicant exposure. Mental health issues and trauma are being studied globally. In global mental health, UCSD leads an initiative with Harvard, GW, and USD to implement new approaches in health care for mental illnesses at the population level. Work on both refugees and immigrants to San Diego County, includes that focused on HIV and related infections (e.g., TB, viral hepatitis, STIs) with large programs in Tijuana, Mexico and Maputo, Mozambique, as well as malaria and neglected tropical diseases. UCSD’s GHI, Center for AIDS Research and Center for Global Mental Health serve to support faculty and fellows working in these areas.

**Health Systems and Health Policy:** Health Policy faculty are actively engaged in research efforts that directly affect the healthcare system. Public Health faculty in the School of Medicine are involved in a wide range of research projects from evidence-based policy sciences, to topics focused on U.S. health insurance, health services research, Medicaid; the design and development of state health exchanges; costs and effectiveness of public mental health services; health disparities and vulnerable populations; pharmaceutical policy and regulation, regulatory science, and community-based research. This research aims to improve health policy decision making, evidence-based policy making, and promote public health and well-being. Faculty serve as a resource for health policy expertise for the School of Medicine, and the broader community at local, state, and national levels, and are active in the local, regional and statewide health policy community. Work is also aligned with the California Legislature and the Mental Health Oversight and Accountability Commission, and nationally with participation in the implementation of the Affordable Care Act and leadership in the Agency for Healthcare Research and Quality. Some notable contributions to health policy by this faculty include work evaluating and regulating tobacco marketing and assessing the role of smoking restrictions in reducing smoking behavior. Concepts of managed competition that underlie the State Health Insurance Marketplaces and participation in their implementation under the Affordable Care Act have also been pursued by our faculty, as has work supporting risk adjustment, and setting payment rates for managed care plans which enroll Medicaid beneficiaries, in nearly a dozen states.

**Pharmaceutical Sciences and Public Health:** Clinical researchers at SSPPS are actively involved in numerous areas where seamless integration with a SPH could be expected (health policy related regulatory sciences, social and behavioral pharmacy, pharmacoepidemiology, and pharmaceutical outcomes). Additionally, basic research faculty support efforts to improve human health by discovering new therapeutic strategies and improving the efficacy and safety of therapy with existing medications. The SSPPS faculty engage not only in challenges related to traditional public health and health care (e.g. cancer, neurodegenerative and inflammatory diseases), but in new efforts directed towards neglected tropical
diseases, the emerging epidemic in antibiotic resistance, and health related effects from pollution and climate change. Three Centers are directly related to Pharmaceutical Sciences and Public Health. **The Center for Discovery and Innovation in Parasitic Diseases** at SSPPS engages in global and public health by seeking cures for globally neglected diseases including Leishmaniosis, Hookworm, Filariasis, African sleeping sickness, Schistosomiasis, Onchocerciasis, Chagas and Amebiasis. Chagas is now a particularly relevant public health concern in San Diego County. A second center that would have important collaboration for the SPH will be **The Collaborative to Halt Antibiotic-Resistant Microbes (CHARM)**. CHARM is a cross-campus initiative deploying innovative research in the field of antibiotic resistance. Approaches include novel drug discovery (natural products), therapies based on new targets such as virulence factors, therapies that boost the immune system rather than targeting the bacteria to avoid off-target effects, microbiome and bacteriophage-based therapies, nanotherapeutics, and big-data systems approaches to personalized medicine. The public health impact of the emerging antibiotic resistance epidemic will require a multidisciplinary approach that includes public health and pharmaceutical science innovation and collaboration. A third Center, **Human Health and the Oceans (H2O)** is a cross-institutional initiative (including SIO) that integrates interdisciplinary medical fields with marine science and engineering to advance discoveries at the intersection between the ocean and human health. Broad areas include the effect of pathogens and toxins in coastal communities, particularly in the face of climate change; the effect of climate change on human health and the discovery of new medicines from the ocean. This research has important public health implications that require integrating the public health epidemiological triad approach (agent, host, and environment) with more in-depth environmental assessments and exposure measurements made possible or vastly improved by new technologies.

**Preventive Medicine:** Faculty have a range of research interests that includes cardiovascular epidemiology; using wearable, mobile and social technologies to improve public health surveillance and interventions; applying engineering data science to the analysis of big health data, and injury (including traumatic brain injury) prevention, in particular in the area of automobile & pedestrian safety as a result of distracted driving/walking and alcohol/other drug use. Faculty in this area have served as advisors for the California State Highway Patrol, the LA Police Department, the New York Police Department, the Department of Defense, and others. Faculty in this are also focus on integrating public health and environmental health information systems with those from clinical settings as well as new forms of social/mobile data; sedentary behavior and physical activity; nutrition, diet, and weight management across the entire age span as well as in those at risk for disease and those with important health conditions such as diabetes, cancer, stroke, anxiety, depression, and PTSD, and the like.

**Interface of Public Health Research with the UC San Diego Clinical Enterprise**

As outlined previously, there is increasing attention to applying electronic medical records and a range of health informatics to inform health policy and care of populations, and to personalize prevention, diagnosis and treatment of health needs to individuals. A SPH will enhance the depth of interactions between UCSD’s public health research with the UCSD health system. Examples are furnished here.

**Department of Biomedical Informatics (DBMI) within UC San Diego Health:** The DBMI, with its tripartite mission of training, service, and research, has close ties with the overall goals of the proposed SPH. Informatics is an established subspecialty in major academic medical centers. Data science has a major overlap with informatics, but the latter includes additional topics such as clinical decision support systems, implementation and evaluation of health information systems, and consumer health informatics, amongst other topics. Informatics may study data at the molecular, individual or population scale, and all are relevant to public health. The current DBMI aligns experts in biomedical informatics, genetics and genomics, computational biology, basic and translational science, and data science and information technology and has developed a computational platform to advance the health of individuals. This large-scale health data platform includes clinical data, genome information obtained for clinical care, certain social determinants of health, patient outcomes data and critically, has a strategy for combining this “big data” with continued acknowledgement of the need for a highly secure environment that takes into account patient / legal issues.
centered on privacy. UCSD investigators lead a large consortium of medical centers (pScanner) to assemble large, harmonized data sets that will provide a valuable source of health knowledge about patients with rare and common conditions. This platform is already of keen interest to health sciences faculty and will be a resource to increase research efforts of faculty in the proposed SPH.

**UCSD Health Resources:** UCSD is at the forefront of analytics and population health. Forty-nine active patient registries in the electronic health record are already in place that utilize a sophisticated architecture and have capabilities to target primary, secondary and tertiary prevention efforts. The population health infrastructure enables bulk communication and orders that are performed to reduce care gaps. It includes capabilities to provide disease targeted decision support, risk stratification, predictive analytics, and high-risk care management. Providers are currently enabled to have access in the electronic health record to 22 active quality performance measures that can drill down to data at the patient level and allow transparent comparisons with peers. The information services team has great experience and provides national leadership related to population health models of care delivery from the perspective of local health systems. The competence and depth of this team is illustrated by the fact that information services supports infrastructure utilized by two other UC campuses (UC Riverside and UC Irvine) as well as the UC San Diego Health’s physician network, a clinically integrated network.

**Current and Future Cross-Campus Efforts in Public Health**

**How a SPH Will Add to the Collaborative Research Efforts Across the UCSD Campus**

As described above, the SPH will build on a strong foundation of the traditional public health research and provide new opportunities with partners spanning the entire campus. Formation of the school will allow UCSD to develop robust and novel public health research programs that draw on UCSD’s world-class strengths in technology, climate and ocean science, mental health, aging, health systems and health policy, and big data. These foci are in tune with evolving public health needs, will elicit innovative science, and accelerate movement of the UCSD SPH to the top ranks of schools of public health.

**Examples of Current Cross-Campus Efforts That Directly Synergize Public Health Efforts**

**The UCSD Institute for Public Health (IPH):** Founded in 2014 brings faculty together to focus on collaborative research across the UCSD campus. It includes 43 faculty from 17 University departments, including those from many area of Health Sciences, SIO, Engineering, the QI, and Computer Science. Current foci of the institute include: 1) Lifestyle, well-being and health behavior, 2) Climate and the Environment, and 3) Technology applications to improve public health. With formation of the SPH, the IPH will be a focal point to synergize campus public health research efforts.

**The Global Health Institute:** UCSD’s GHI facilitates research, education and public/private partnerships across diverse disciplines to address global health challenges. The GHI’s themes include Global Infectious Disease, Global Health Technologies, and Global Mental Health. The goal of the GHI is to serve as a resource for coordinating UCSD global health projects, courses, research, and training programs for the local global health community. The GHI would be allied to future SPH research efforts.

**The Policy Design and Evaluation Lab:** PDEL is an international focal point for rigorous empirical research on the interplay of public policy, technology, and economic development. It is located within UCSD’s GPS. PDEL is a multidisciplinary collaboration combining advanced social science methodology with the power of information technology to design policies and programs that alleviate poverty, promote health, welfare, and security, and enhance accountability. Current Public Health related focus areas include: Climate Change and Human Health, Mobile Phone-Based Pulse Oximeter, Consanguineous Marriage and Intimate Partner Violence, and Using Big Data and Experiments to Solve the Last-Mile in Polio Vaccinations.
Research Resources of Other Schools, Centers, and Departments across the UC San Diego Campus

(These entities include faculty doing public health research where great opportunities exist to expand cross-campus collaborative efforts)

**The Jacobs School of Engineering Agile Research Centers and Interdisciplinary Institutes:** In addition to six academic departments that cross a broad spectrum of engineering disciplines, the UCSD JSOE charters innovation and impact of engineering in the marketplace through its Dean’s Agile Research Centers that are all highly important and relevant to the proposed SPH. These include the Center for Wearable Sensors, an important resource on campus connecting with key industrial partners bringing pervasive 24/7 and unobtrusive health monitoring technology to the benefit of global health awareness and impact, and lessening the burden, cost, and ineffectiveness of centralized and often unnecessary patient care delivered in hospital settings. The Center for Microbiome Innovation is another important resource bringing together School of Medicine and JSOE faculty (including a third of all Bioengineering faculty) for revolutionary advances in personalized health and diagnostics enabled by microbiome analysis. This Center also does environmental research e.g. looking at long-range transport of microbes in dust and clouds, modeling the effects of climate change on microbial metabolism, etc. In addition JSOE, School of Medicine and other divisions on campus partner through the Office of Research Affairs to bring highly interdisciplinary research to the benefit of public health through major ORU Institutes on campus. In addition to California Institute for Telecommunications and Information Technology (Calit2) / QI, these include IEM, an ORU that facilitates the integration of engineering principles and novel technologies with biomedical and translational research. IEM is comprised of 15 centers and more than 200 faculty from the Engineering, School of Medicine and SSPPS, working with departments to create programs in which students and scientists can apply engineering and technology to healthcare. Likewise, the Institute for Neural Computation (INC) spans an extensive network of faculty collaborating across JSOE, DBS, DSS, and School of Medicine in advancing a new theory of computation inspired by and in service of the life sciences. In particular, INC advances neurotechnology for mental health monitoring and continuous diagnostics and therapy through electrocetual personal treatment using closed-loop neurofeedback / biofeedback.

**The Halıcıoğlu Data Science Institute:** The mission of UCSD’s new Halıcıoğlu Data Science Institute to develop new methods and infrastructure, and train students, faculty and industrial partners to use data science in ways that will allow them to solve some of the world’s most pressing problems. By developing new tools and educating the next generation of data scientists, the institute’s goal is to improve our quality of life as digital data continues its integration into the infrastructure of commerce, healthcare, government and education. The institute will study both the principles, methods, and tools that will enable us to understand the nature of digital data, and also the intersections between this new field and existing disciplines. The Institute seeks to achieve its goals by catalyzing new research and by advancing teaching and training of talent in this area. HDSI looks forward to engaging with SPH in creating research thrusts and tools that advance public health practice and help create new programs, including a minor in data science that is tailored to students majoring in public health studies.

**The Center for Oceans and Human Health (SCOHH):** SIO focuses on discovering the main marine sources and sinks of natural compounds and how biosynthesis and distribution of these products in the oceans impacts human health. Particularly considering the joint faculty that already exist between SIO and Health Sciences, formation of the SPH would allow an increase in the collaborative scope of COHH-SPH efforts to encompass other public health research topics.

**The San Diego Supercomputer Center (SDSC):** UCSD enables science and engineering discoveries through advances in computational science and high-performance computing. Managing and extracting value from “Big Data” is another expertise of the SDSC with enormous public health potential. Research efforts
that utilize the SDSC will be a key component of our proposed SPH and mesh with the efforts between the SPH and the UCSD Department of Biomedical Informatics described above.

**Emerging areas of public health research at UCSD’s SPH**

With formation of the SPH, we envision additional emerging research areas that provide for an impactful research portfolio that will also merge with future educational offerings of the SPH. Some potential efforts may include:

1) **Engineering, Technology and Public Health:** A major enhancement in study and education in engineering, technology and public health would be created by the SPH. A step in development of a program in Technology and Public Health came with establishment of CWPHS, a partnership between Health Sciences and the Calit2. CWPHS faculty have collaborated for over a decade with multiple entities at the JSOE on projects that leverage technology, particularly wearable sensors and other consumer-facing technology, in the pursuit of public health. CWPHS faculty members have also been at the forefront of exploring the ethical, social and legal issues related to the use of new technologies to monitor and intervene on health states. This includes NIH-funded research to refine how technologies handle privacy of health information, and a Robert Wood Johnson Foundation funded project sharing research protocols and materials that support ethical conduct of research in the new era of mobile/social health data. With an SPH, we expect to capitalize on a myriad of opportunities for collaboration between faculty in the Design Lab, other units within the Institute for Engineering in Medicine, the Center for Wearable Sensors, and other centers at UCSD that will inform our future development of technology-focused projects.

2) **Increased emphases on cross-border global health:** UCSD is the closest UC campus to an international border, being within 30 miles of Mexico. Currently, there is no unified presence or partnership for these cross-border activities. With formation of a SPH, UCSD can establish a formal San Diego-Tijuana partnership for research and education that aligns with the UCOP Mexico-US Initiative. UCSD already supports a global health undergraduate major and a global health track in the Public Health JDP. A SPH would unite these programs / students, and increase cross-border research.

3) **Data-driven public health research:** With the formation of a SPH, Health Sciences faculty collaborating with the health system, scientists at the JSOE, particularly in Computer Science and Engineering, and Electrical and Computer Engineering, Health Sciences’ bioinformaticians, and the SDSC, will advance expertise in, and contributions to Big Data / Data Sciences. Faculty expertise in analysis of social media data (meta data analytics) and geographic information systems (GIS) will further enhance these efforts.

4) **Climate, the Oceans and Public Health:** Through the efforts begun with joint SIO-UCSD recruitments and emphasized above, we have established a strong commitment to investigating the health effects of climate change both for populations and the planet. Health Sciences and SIO are eager to expand their collaborations in exploring the nexus of climate change, pollution, and ocean science with Public Health. An SPH would strongly support our collaboration with SIO on its planning to develop a Climate and Health Interdisciplinary Research Program (CHIRP). CHIRP will further push the envelope on climate-health research into uncharted territory. For example, interactions between climate-change driven trends in vector (e.g. dengue, malaria) and water-borne disease incidence can be influenced by extreme weather. CHIRP will be in a unique position to provide objective scientific and actionable answers for humanity in a rapidly changing world.

5) **Mental Health and Addiction:** Depression and other mental illnesses and addiction are leading causes of disability across the world. Faculty in the Departments of Psychiatry (School of Medicine) and Psychology (Social Sciences) are active in public health oriented research. Mental illnesses result in poor quality of life, increase healthcare costs, and complicate management of comorbid physical disorders. A public health perspective to mental illness is critical for improving availability, access, and affordability, and improving overall health outcomes for Americans. Strengths in health systems, technology, and
global mental health are integral to future research and will be connected in a SPH environment. The opioid epidemic has led to rising overdose deaths from approximately 10,000 per year in 1990 to 60,000 in 2016. A public health response is needed to promote prevention of harmful drug use and access to opioid treatment (e.g., methadone and buprenorphine maintenance), as well as harm reduction approaches (e.g., syringe exchange, naloxone provision). As the U.S. and other countries adopt more liberal drug policies, public health researchers will be needed to monitor and evaluate their impacts. UCSD has a large and growing number of faculty working in these various aspects of addiction. We therefore see investigations of mental health aspects of Public Health as an area to make an important global impact by coalescing the many strengths already in place at UCSD.

6) **Healthy Aging and Public Health:** Four multidisciplinary centers at UCSD are already engaged in Healthy Aging. The Artificial Intelligence for Healthy Living Center (AIHL) features a collaboration with the IBM Cognitive Horizons Network, an international consortium of leading universities. The Center for Healthy Aging is an innovative collaboration that brings together schools of medicine, pharmacy, engineering, and management as well as the undergraduate and graduate campus. The Stein Institute for Research on Aging and the Center for Life Course Research at UCSD ACTRI are two other prominent cross-disciplinary venues for aging research (see Appendix E). The SPH will therefore have the opportunity to build on an extremely strong network of interdisciplinary collaboration in focusing on the public health aspects of aging. The Center for Healthy Aging has been recognized as one of UC San Diego’s Frontiers of Innovation Centers. There are collaborations with community residents, Foundations, Housing and technology industries, and the Area Agency of Aging.

7) **Health Systems and Health Policy:** Enhancing collaborations across the UCSD campus could multiply the impact of efforts to study how health policy impacts health care systems. Faculty in Economics, the GPS and the Rady School of Management are working on a broad US-focused health economics research agenda that touches on the US Medicare program, the US Medicaid program, physician payment, medical innovation, and spillovers between public and private insurance. Areas of investigation include evaluation of how such programs influence infant health with long term consequences; research on household responses to adverse health events; and the relative effectiveness of public clinics and unlicensed health care providers in India. Additional faculty members in Health Sciences are actively engaged in research efforts that are evaluating health care systems in different countries. These range from the evaluation of interventions aimed at primary care and behavioral health practice transformation in the US and globally to the design and functioning of the state health exchanges under the Affordable Care Act. The proposed SPH could enhance partnerships of all of these faculty, with the UCSD Health system, to bring evidence-based approaches to the implementation of health care strategic plans.

8) **Population Health:** Healthcare in the US is evolving quickly. Some of the most significant changes involve the movement of financial incentives away from the volume of services provided to the value (defined as quality + service/cost). Not unlike the health care systems in Great Britain and Canada, there is an increasing emphasis on prevention and wellness. As part of value-based care delivery, providers will be rewarded for keeping patients healthy rather than being paid every time a patient gets sick. Providers and systems that are most successful in this new environment will need to master population health. Population health is a relatively new term in healthcare although some of its underlying precepts are not new. Modern population health builds upon public health approach to disease prevention, prevention models, and opportunities afforded by the electronic health record. Mastering population health involves understanding the characteristics of a population and having the analytics to predict, intervene and connect with the population in order to promote wellness, prevent disease and control costs. A SPH will help UCSD to build a world-class effort in population health.

9) **Ethical and Social Issues in Public Health:** UCSD was founded by leaders who cared deeply about the ethical and social implications of science, technology, medicine and health. For example, Roger Revelle, a pioneer in the science of climate change, culminated his career at UCSD as a Professor of Science,
Technology and Public Affairs. Similarly, UCSD’s first chancellor, Herbert York, a physicist with the Manhattan Project, became an arms control expert who was ambassador to the Comprehensive Test Ban negotiations in the late 1970s. The Institute for Practical Ethics at UCSD is building upon this institutional history as well as on existing strengths in the humanities, social sciences, health sciences and natural sciences. Inspired by these examples, the Institute aims to attend to both the theoretical components of ethical problems and the pragmatic policy-focused aspects. The Institute is based on a partnership among social scientists, natural scientists, and humanists on campus. Ethics can be fruitfully conducted on an ideal level, but it is desirable for the work conducted to be relevant to important topics facing individuals and society. To this end, the Institute promotes analysis of the social structures that shape how ethics will actually operate in our society and of course the relevant natural science or technology. Finally, faculty affiliated with the Institute conduct both social and individual analyses.

Much of bioethics proceeds on the assumption that ethics only concerns the relationship between individuals (e.g. patient and doctor, fetus and pregnant woman). However, individuals are embedded in society, and society is not simply the average of individual interests, which is true even more so in the realm of public health. For instance, climate change is not an individual but rather a social problem. The proposed SPH would foster the expansion of the work conducted by the Institute for Practical Ethics and enhance partnerships of faculty with the UCSD Health system to build a world-class program focused on the ethical and societal issues in public health and emerging public health technologies.

Research Mission Conclusion
We believe that a SPH is required for UCSD to be transformative in public health research as well as our other important missions of education, service, and practice. A School would provide a clear central point for connection and fostering research collaboration with our community and outside UCSD partners. Our vision is to build strong cross-campus collaborations and create an atmosphere of open interdisciplinary engagement similar to what has evolved at the Qualcomm Institute, Jacobs School of Engineering, and within the School of Medicine. We envision public/private partnerships and a broad research portfolio that aligns with UCSD’s priorities as we work together to advance the new science of public health throughout the world. The proposed SPH would increase visibility, reduce fragmentation and promote synergy of public health and global health research efforts, allowing UCSD to become highly competitive in the discipline of public health, nationally and internationally. It is no accident that the innovative areas of public health envisioned for our proposed SPH happen to be UCSD areas of world-class strength. Strong leadership and faculty support for the SPH will lead to more research collaborations, Center grants, training grants (T32s), partnership grants, joint research hires, and a new level of creativity, innovation, and entrepreneurship. These developments will lead to new funding streams and increased philanthropy support. We have the foundation to be recognized as a world-class hub for public health research and innovation.

FINANCIAL PLANNING
Our Financial Plan uses current resources and does not request any additional state funds or FTEs. Our pre-proposal included two budget options: one with no new funds and one with a potential $25M philanthropic gift which would increase the pace of achieving our aspirational goals. After our pre-proposal was approved by UCOP in July, 2018, Dr. Herbert and Nicole Wertheim executed a gift agreement with UC San Diego to provide a $25M gift to support a School of Public Health at UCSD. Their first pledge installment was received in October, 2018. Additionally after our pre-proposal was approved and the gift agreement signed, the Chancellor committed $5M and the Vice Chancellor for Health Sciences committed $2M towards faculty recruitment and growth. Further information on these commitments is provided below. UCSD’s Vice Chancellor and Chief Financial Officer, Pierre Ouillet, has been actively engaged throughout the planning process and is supportive of our plan. The operating budget plan was developed and reviewed in partnership with the UC San Diego Associate Vice Chancellor for Resource Administration and the Assistant Vice Chancellor for Campus Budget Oversight.
The financial projections for the SPH include the operating budget, fundraising efforts underway, and a capital plan that demonstrates the financial viability of the proposed School. The SPH will primarily leverage the existing resources within UCSD Health Sciences. Existing faculty, staff, degree programs, revenues, and research programs currently within the Department of FMHP as well as the Division of Global Public Health (GPH) in the Department of Medicine provide the foundation for the school. A preliminary capital and facilities plan has been developed and is based primarily upon future philanthropic support. Given the existing resources and faculty, no new funds or additional faculty FTEs are requested from the state to create the school.

The school’s operating budget was developed with projected modest growth as the school matures to steady state. Most of the educational degree programs (Bachelor of Science in Public Health (BSPH), Master of Public Health (MPH), Public Health PhD, Biostatistics PhD, Interdisciplinary Research in Substance Use PhD, Masters of Advanced Studies in the Leadership in Healthcare Organizations) proposed to be in the school are already operational, and approximately 100 faculty are excited about having primary or joint appointments in the SPH. Thus, this proposal differs from the de novo creation of a school that characterizes most new school proposals, and the projected rate of growth will be incremental and modest. The projected growth in students primarily includes reaching steady state enrollment numbers in our existing MPH, Biostatistics PhD, and IRSU JDP programs. Our Biostatistics MS was approved early in 2018 by all HS committees and the UCSD Representative Assembly and is in CCGA review now. It is scheduled to launch in Fall of 2019, the same year as the School’s proposed start, FY19/20. A second independent PhD is projected to matriculate in Fall of 2022. Similarly, the faculty and administration largely already exist at UCSD in Health Sciences Department of FMHP and Division of GPH, and growth will be incremental.

Dr. Herbert and Nicole Wertheim became attracted to UCSD as a public university having a strong foundation in public health and strong potential to further the goals of public health, including strengthening partnerships with engineering, Scripps Institution of Oceanography, Healthy Aging Center, and others. They have now fully committed to the UCSD School of Public Health with their executed $25M gift agreement. This gift will go to endowment for the perpetual support of the School and its missions. They have already given the first $1M with $2M to follow per year for the next 12 years, subject to UC approval of the SPH. The endowment will support the core School, faculty recruitment and support, staffing, education and scholarships, research development, community engagement, and public outreach. This endowment payout support is included in the financial plan budget and will grow substantially as the School advances past the first four years. At 4% annual payout, the Dr. Herbert and Nicole Wertheim endowment will contribute $1,000,000 of operating support per year to the School at maturity.

In support of faculty recruitment and growth of the SPH, UCSD’s Chancellor Khosla will provide five $1M endowed professorships to support joint or collaborative positions between the SPH and other disciplines in Health Sciences, the Scripps Institution of Oceanography, Engineering, and the General Campus. These endowments will provide $40,000 per year to each professorship. We project filling these Chancellor’s endowed professorships with one in the first year, two in the second year, and one each in years three and four and represent both the revenue and expense in the budget. These endowed professorships are excellent opportunities to attract donors who can add to the principal to capture a named endowed chair professorship (see Plan for Philanthropic Campaign below).

Further, Vice Chancellor for Health Sciences Brenner has committed an additional $2M towards the School consisting of $500,000 per year in the first four years for faculty recruitment and startup packages. During the first four years in which the VCHS is providing this $500,000 per year for faculty recruitment, little of the Wertheim endowment will be used for recruiting faculty but rather will contribute, with other funds, to support two new staff positions for the SPH as previously proposed in our pre-proposal: an Educational Division MSO, who will provide overarching support to and coordination among our degree programs, and a Public Relations / Marketing position. After the first four years, the endowment and SPH revenues will have
grown considerably and will support both the new staff positions and regular funding for recruitment of new faculty.

We anticipate that approximately 100 Health Sciences faculty in Public Health and Global Public Health (86 Public Health from FMPH, 13 from GPH) will join the SPH. Faculty will have the choice whether to move their primary appointment into the SPH. Faculty in FMPH have been polled about their preferences, and almost all of the public health faculty (that is, excluding faculty in family medicine and preventive medicine) who responded to the poll expressed interest in moving their appointment. Further, as attested in the letter from Davey Smith, Division Chief of Infectious Diseases and Global Public Health in the Department of Medicine, 10-15 faculty from that division are expected to move their primary appointment to the SPH, and another 10-15 are expected to request secondary appointments. The 29 public health related administrative Staff positions within FMPH and GPH will also to transfer to the school. The FMPH administrative staff positions dedicated to the clinical Division of Family Medicine will stay in the School of Medicine. Funding and revenues include those aligned with faculty and programs that are anticipated to join the SPH, including the 30 existing state-funded faculty FTEs; research grants and contracts, grant indirect cost return operating revenue; tuition and fees; service agreement, contract, and self-supporting activity taxes; and standing institutional commitments. Tuition, fees, and JDP contract funding are generated by all of the current degree programs and would likely expand with future offerings and the increased profile the SPH will bring to our programs. Direct total costs from current research grants and contracts is in the amount of $160M (total project periods’ direct costs; including ~ $15.5M NIH annually). These direct costs research funds and faculty-generated service and consulting agreements and programs direct costs are excluded from the school’s operating budget, as well as the associated 200+ research staff. Space utilization will also continue as current until funds are raised for a new SPH building. Included in the budget, we have at minimum $2.5M for the first four years for faculty recruitment and start-up funds in the plan, starting with $725K in the first year. This includes the support from the VCHS, MPH, and Biostatistics program. Further, as we have in the past, we will continue to seek opportunities to utilize the Chancellor’s Joint Recruitment Plan for recruitments in conjunction with main campus departments in which the Chancellor provides half of the FTE, half of the startup, and a FRAP. In addition to opportunistic joint recruitments, we have a specific plan submitted to the Chancellor and EVC for a targeted Public Health (currently Department of FMPH) and Scripps Institution of Oceanography multi-recruitment. We have worked out how the movement of faculty appointments and their grant funding will transition, including the impact on existing departments. This has included discussions with the Chairs. After the Department of Family Medicine and Public Health public health faculty migrates to the SPH, the Department will likely change its name, perhaps to its former title of the Department of Family Medicine and Preventive Medicine, or perhaps, the Department of Family Medicine (subject to department name change process approval, and, more importantly, yet to be made decisions by some Preventive Medicine faculty about where they want their primary appointment to reside). There is broad and enthusiastic public health faculty interest and commitment to the SPH. They contributed to the pre-proposal and have been the architects of this pre-proposal plan.

Agreements are being established between the divisional deans and the administration to facilitate the process for establishing joint appointments in the SPH and reviewing faculty. The SPH will leverage additional joint appointments to increase the impact of the SPH and also in the other Schools / Divisions. We had great engagement across the UCSD campus and within UCSD Health Sciences to get input, feedback, and engagement.

**UCSD Faculty and Campus Engagement:** There was great involvement from front line faculty in FMPH, as well as Medicine, Psychiatry, the School of Engineering, Social Sciences and SIO in the development of the pre-proposal. The VC, SOM Dean, and Chairs of the Departments agree with the plan that the funds supporting individual faculty will move from SOM / Departments to the new SPH with those faculty. As noted, the FMPH public health oriented faculty will move to the new SPH; however nearly all of the FMPH faculty who are the Division of Family Medicine, as well as a few Division of Preventive Medicine physicians, will likely stay in the residual Department (with welcome opportunities for secondary
appointments in the SPH). Roughly half of Family Medicine faculty have already indicated that they would desire a secondary appointment in the SPH. Input for the plan included HS Faculty Council, HS Council of Chairs, and HS Research Council. In addition the UCSD Health Executive Group Board (EGB) and Board of Governors (BOG) gave input. There have been HS Town Hall Meetings with faculty, leaders, and staff and student forums. In addition, the SPH idea has been prominently discussed in HS Strategic Planning meetings (Research, Clinical (leadership summit, IT leadership, group practice), faculty affairs / academic affairs, Health Science International, Medical Education, & School of pharmacy), Department Meetings and Retreats, including FMPH, Medicine, Psychiatry department faculty, and others. The School of Engineering has also held many Dean and Chair level meeting with FMPH faculty and HS leaders regarding opportunities with the SPH. All FMPH & Medicine GPH Division faculty are aware and engaged and a substantial number are on the SPH proposal Executive Committee or Advisory Group. The UCSD Institute of Public Health faculty and advisory group are engaged and supportive of being a part of the SPH future.

Operating Budget

The proposed budget for the SPH projects revenues and expenses over the first four years of the School. Our pre-proposal had included two budget options: one with no philanthropy and one with a prospective $25M gift. Having now received a $25M gift from Dr. Herbert and Nicole Wertheim, we now present only one budget model.

The budget includes opening and growth from FY19/20 – FY22/23, when the school is expected to reach its initial mature steady state. Faculty expenses include only faculty pay from state FTEs, educational programs pay, HS VCO support, and the Chancellor’s five endowed professorships. Staff expenses include only administrative staff. No grants, contracts, service agreements, or other faculty generated programs’ direct-expense revenues or expenses are included in the school operating budget. IDC return from grants and taxes on contracts, service agreements, etc. are included as they are core operating budget revenue. As noted previously, no new state funds or FTEs are requested or included in our proposal or budget.

Upon opening of the SPH, the existing Health Sciences Public Health faculty (per process described), staff, operations, programs, revenues, and expenses will transfer from the Department of FMPH and the Division of GPH to the school. Newly included funding components are:

- the Wertheim endowment annual payout
- Chancellor’s five endowed professorships’ payout, and
- VCHS faculty recruitment support

As a result of these additional commitments, faculty recruitment and startup funds for the first four years of SPH operation are now budgeted at $2.5 million, substantially more than the $600,000 budgeted in the First Option Financial plan in the pre-proposal, and almost double the $1.3 million budgeted in the Second Option Financial Plan. Other changes from the pre-proposal are an increase in the MPH steady state enrollment projections from 50 per cohort to 65 (projected to be reached for the incoming class of FY22/23) and reduction of Associate Deans’ stipends, given that Associate Deans are expected to have FTEs, which include institutional service. Stipends are still projected to start in year two. No additional philanthropic or other funding streams are projected; however new funding streams will be sought through philanthropy (see Plan for Philanthropic Campaign below), innovation & entrepreneurship development such as continued and greater development of relationships with private sector partners, e.g., in the areas of data, wearable devices, and preferred education program provider agreements, growth of services to UCSD internal and external customers, and actual devices and products.
## UCSD School of Public Health

### Proposed Operating Budget

**All Programs Combined**

*Excludes revenue/expense on research funds*

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<td>14,197,304</td>
<td>15,320,964</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Expense</th>
<th>FY19/20</th>
<th>FY20/21</th>
<th>FY21/22</th>
<th>FY22/23</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty salaries and benefits</td>
<td>5,309,699</td>
<td>5,733,467</td>
<td>6,041,203</td>
<td>6,360,337</td>
</tr>
<tr>
<td>Deans salaries and benefits</td>
<td>468,750</td>
<td>580,813</td>
<td>603,387</td>
<td>621,488</td>
</tr>
<tr>
<td>Staff salaries and benefits</td>
<td>2,820,762</td>
<td>3,108,484</td>
<td>3,198,277</td>
<td>3,290,764</td>
</tr>
<tr>
<td>TA salaries and benefits</td>
<td>282,281</td>
<td>290,749</td>
<td>299,472</td>
<td>308,456</td>
</tr>
<tr>
<td>HS Shared Services</td>
<td>881,171</td>
<td>911,603</td>
<td>939,855</td>
<td>968,055</td>
</tr>
<tr>
<td>SPH Endowment Initiatives</td>
<td>56,560</td>
<td>103,120</td>
<td>149,680</td>
<td>196,240</td>
</tr>
<tr>
<td>Faculty Recruitment and Startup</td>
<td>725,000</td>
<td>675,000</td>
<td>550,000</td>
<td>500,000</td>
</tr>
<tr>
<td>Supplies and Expense</td>
<td>319,102</td>
<td>354,775</td>
<td>365,106</td>
<td>375,159</td>
</tr>
<tr>
<td>Other</td>
<td>177,543</td>
<td>205,269</td>
<td>228,653</td>
<td>252,792</td>
</tr>
<tr>
<td>Prof Student Financial Support</td>
<td>826,666</td>
<td>1,168,046</td>
<td>1,273,617</td>
<td>1,466,260</td>
</tr>
<tr>
<td><strong>Total Expense</strong></td>
<td>11,867,534</td>
<td>13,131,325</td>
<td>13,649,250</td>
<td>14,339,552</td>
</tr>
</tbody>
</table>

| MPH Program Startup Loan - Use | 381,851 | 0       | 0       | 0       |
| MPH Program Startup Loan - Repayment | 0       | 0       | 250,000 | 400,000 |

| Surplus                        | 12,744   | 30,564   | 298,054  | 581,412  |

As the School will be in Health Sciences, it will continue to utilize and leverage the existing VCHS and campus support units currently used by FMPH and our degree programs (just as the rest of SOM and School of Pharmacy). This includes the VCHS shared service cores for academic (ARC) and staff (HHR) HR, IT, and grants management core (RSC), visa processing, Grad Division / Admissions, registrar, financial aid office, classroom scheduling, both HS and campus grants submissions offices (HSSPPO, OCGA), and Office of Post Award Financial Services. Further, utilization of institutionally supported infrastructure such as facilities maintenance, renovation and construction project management, engineering and design, security, custodial and grounds services will continue. The HS shared services are a direct cost and are already in the budget as they are current expenses. The other general support offices and services are not a direct cost to departments or schools and are provided by HS and the campus.

In addition to these institutional services and recourses, both UCSD and Health Sciences have developed programs in support of large or complex grants such as center grants, program projects, and T32s and other training grants. One example includes the Health Sciences Training Grant core that has developed and provides centralized expertise in the complexities of T32s and similar training grants that have considerable and diverse components that have often been a barrier to those without experience. FMPH has very recent and positive experience using this T32 proposal support core and on Oct 19, 2018 received a perfect impact.
score of 10 on a T32 submitted to the NIH National Institute on Aging entitled “Improving the Health of Aging Women and Men. Another resource is the Center Launch Program provided by the Vice Chancellor for Research and Office of Research Affairs which provides seed funding for planning and development activities leading to the submission of proposals for major extramural research support making three $25K and three $75K awards per year. Further, the Department of FMPH has several years of experience providing peer-reviewed intramural seed grants for development of center and PPG grants. This Department program has been successful with the pilot projects leading to successful proposals for an NIH P01 and an AHA center grant, as well as a few R01s and other grants. We will continue these productive intramural development seed grants in the SPH.

Dr. Herbert and Nicole Wertheim Endowment Funded Initiatives

The Wertheim endowment initiatives include scholarships, research pilot grants, education programs enhancement, community engagement and outreach, faculty recruitment, staffing, and faculty and staff development.

Augmentation of educational programs includes funding to support development of courses in new areas, cross-campus collaborative courses, and pedagogic advancement. A substantial portion of the endowment will be used for scholarships and fellowships to support students who are under-represented, first in family to attend college, have low household income, and others.

Research investment from the Wertheim endowment includes a robust research pilot grant program that will enable the development of preliminary data, proof of concept designs, community networks, and systems that will develop faculty research experience and capability, lead to actionable public health impacts, and in particular enable subsequent proposals for substantial extramural funding to the school. Such grant growth will concomitantly increase IDC return revenues supporting core operations. All intramural grants programs will be peer reviewed. Health Sciences, and specifically FMPH, faculty have years of successful experience in implementing peer-reviewed intramural grant programs with positive outcomes and extramural funding return on investment. Startup funding for faculty recruitments will also be supported. Research seminars and retreats will be supported to grow cross-discipline and cross-campus collaborative research.

Community engagement and outreach initiatives include intramural grant opportunities related to developing and advancing community based public health research programs and seeding research projects, both of which will further extramural grant applications or philanthropic attraction for ongoing programmatic support. Public seminars and lectures will be developed to support engagement with the community and dissemination of applied public health knowledge and practices and publication of education and community initiatives. Emphasis will be placed on public relations and establishing a robust web and social media presence for the school which is instrumental to reputation development and recruitment of both students and faculty.

Junior faculty development, mentoring, and success will be further supported through training programs, retreats, scientific meetings travel support.

See Appendix F for projected Wertheim endowment use.
Financial Modeling Assumptions

Student Enrollment

Enrollment projections for the SPH:

<table>
<thead>
<tr>
<th>Students</th>
<th>FY17/18</th>
<th>FY18/19</th>
<th>FY19/20</th>
<th>FY20/21</th>
<th>FY21/22</th>
<th>FY22/23</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSPH - Enrollments</td>
<td>2,100</td>
<td>2,200</td>
<td>2,350</td>
<td>2,350</td>
<td>2,350</td>
<td>2,350</td>
</tr>
<tr>
<td>BSPH - Students in Major</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>BSPH - Student FTE</td>
<td>187</td>
<td>196</td>
<td>209</td>
<td>209</td>
<td>209</td>
<td>209</td>
</tr>
<tr>
<td>MPH</td>
<td>22</td>
<td>62</td>
<td>90</td>
<td>105</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>Public Health - JDP</td>
<td>52</td>
<td>52</td>
<td>52</td>
<td>52</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>Biostats - PhD</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>23</td>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td>Biostats - MS</td>
<td></td>
<td>15</td>
<td>35</td>
<td>40</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>IRSU - JDP</td>
<td>12</td>
<td>16</td>
<td>18</td>
<td>19</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>Planned 2nd Independent PhD</td>
<td></td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>Graduate Students Total</td>
<td>74</td>
<td>105</td>
<td>167</td>
<td>222</td>
<td>246</td>
<td>270</td>
</tr>
</tbody>
</table>

Total Students

| BS sFTE + Graduate Students | 261 | 301 | 376 | 431 | 455 | 479 |
| BS Majors + Graduate Students | 674 | 705 | 767 | 822 | 846 | 870 |
| TA FTE                       | 10  | 14  | 15  | 15  | 15  | 15  |

The **BSPH** is in its sixth year and grew rapidly as a desired major at UCSD. We are projecting 2,200 BSPH enrollments in the current FY18/19 year, increasing to 2,350 by FY19/20 and steady there forward. For the past two years, we have been intentionally conservative with the growth program. With over 500 majors, the program is projected to reach 600 majors by year end. We currently plan to maintain that size as steady state. The program is fiscally solvent, and revenue is an allocation from the EVC AA based on number of course sections taught and enrollment. UCSD is targeting to increase undergraduate enrollment by a few thousand over the next few years. There will be opportunity to grow the BSPH if the program / School desire.

The **MPH** has matriculated its inaugural class with 22 students this fall. It will grow to a steady state enrollment of 65 per incoming class, 130 in the 2-year program. This is an increase from the 50 per cohort, 100 total projected at the time of the pre-proposal. While the program and Department determined to make this modest increase in program size based on local factors, we acknowledge that it is also in line with pre-proposal reviewers’ comments / suggestion. Given that all requisite courses are budgeted and increasing class size only negligibly increases costs, the program and faculty could accommodate some further increased enrollment to generate additional operational if necessary. While 22 students for this year is less than the 25 projected, revenue is not diminished as we have 5 out of state students but had projected only CA residents. The MPH program has been given startup loan access to cover faculty, staff, and operational costs and faculty recruitment ahead of revenue. Repayment of the loan is projected to commence in FY21/22 as the program generates a substantial positive bottom line. Programmatic surpluses, which will increase significantly upon loan payoff, will support the school’s greater missions and budget and further development of the MPH program itself. These MPH enrollment projections and revenues / expenses are based upon up-to-date revenue and expense projections for the program. To better serve and attract med students, clinical fellows, other MD and professionals, we are well into development of a one year MPH.

The **JDP in Public Health** with SDSU has been in place since the early 1990s. The program is projected to continue with ~12 students entering per year. The program receives funding via a contract with SDSU that covers expenses. As covered previously in this proposal, SDSU counts this program to meet its CEPH
school accreditation requirements, and we are committed to our collaboration with SDSU and continuing the program in perpetuity.

The PhD in Biostatistics is in its third year and has been very competitive in attracting students, with over 80 applicants in its first year for the 4 slots expected and over 100 applicants in each of the past two years. The program has 13 students in the current FY18/19 year and will grow at this rate to a steady state enrollment of 26 students in the program. The proposal for an MS in Biostatistics has been reviewed and approved by UCSD Representative Assembly and is now under review by CCGA. We expect approval and enrollment of 15 students in Fall of 2019 (FY19/20) growing over 6 years to a steady state of 60 students in the 2-year program. Forbes has ranked Biostatistics as the No. 1 Master’s degree for jobs.

The JDP for Interdisciplinary Research in Substance Use with SDSU has a current enrollment plan of 4 students entering per year, with 12 students total in the program in FY17/18 and growing at this rate to a steady state enrollment of 19 total students by FY20/21. As with the JDP in Public Health, this program receives funding via a contract with SDSU.

As discussed in this proposal, the UCSD SPH will launch a second independent doctoral program, complementing our Biostatistics PhD and two JDPs. The focus of this program is yet determined but will draw on the strengths of the school and UCSD, such as a doctoral program in climate and health, data science, engineering and public health, population health, or mental health and public health. This program will be necessary to meet CEPH school accreditation requirements and is projected to be a small program that leverages much of the existing curriculum in the Public Health doctoral program as well as in the SIO, Bioengineering, and across campus. The program will receive the standard block grant, and students will be supported by TAships and GSR / research funding with the potential for a T32 training grant.

Faculty

Faculty projections for the SPH:

<table>
<thead>
<tr>
<th>Faculty</th>
<th>FY17/18</th>
<th>FY18/19</th>
<th>FY19/20</th>
<th>FY20/21</th>
<th>FY21/22</th>
<th>FY22/23</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty Headcount</td>
<td>95</td>
<td>99</td>
<td>103</td>
<td>107</td>
<td>110</td>
<td>113</td>
<td></td>
</tr>
<tr>
<td>Total State Funded FTE</td>
<td>30.0</td>
<td>30.0</td>
<td>30.0</td>
<td>30.0</td>
<td>30.0</td>
<td>30.0</td>
<td>26.5 Health Sciences, 3.5 EVC</td>
</tr>
<tr>
<td>Faculty Teaching FTE</td>
<td>14.7</td>
<td>19.5</td>
<td>21.6</td>
<td>23.3</td>
<td>24.0</td>
<td>24.2</td>
<td>State FTE (11-12), Self-Supported FTE (5-6), Temp FTE (7-8), Endowed</td>
</tr>
<tr>
<td>Faculty State FTE Research &amp; Service</td>
<td>19.0</td>
<td>19.0</td>
<td>19.1</td>
<td>18.9</td>
<td>18.6</td>
<td>18.7</td>
<td>State FTEs, Endowed</td>
</tr>
</tbody>
</table>

Faculty may have primary or joint appointments in the SPH. We anticipate that about 100 Health Sciences faculty in public health and global health (86 Public Health in FMPH; 13 in Global Public Health in Medicine) will choose to join the SPH. Health Sciences leadership and faculty have prior experience in developing a new school in Health Sciences when the Skaggs School of Pharmacy and Pharmaceutical Sciences (SSPPS) was created. There will be similar processes that occur, including hiring of a SPH Dean, maintaining the Department with a chair, and having faculty elect to join or affiliate with the new SPH, including faculty from Health Sciences and the General Campus. Family Medicine faculty remaining in the Department (an additional 50 faculty) may wish to have secondary appointments in the SPH, while those not clinically active in the UC San Diego Health System may wish to move their primary appointment to the school. A number of FMPH Family Medicine Division faculty have already expressed interest in joint appointments in the SPH. Similar to the creation of SSPPS, Health Sciences will support having these resources continue in the faculty’s chosen unit (SPH or Department). The 100 Public Health and Global Public Health faculty in Health Sciences hold 30 state FTEs: 26.5 Health Sciences plus 3.5 EVC funded. FTEs that follow the holder to the SPH will transfer permanently to the school.

The SPH currently has approximately $2.5M committed and budgeted for faculty recruitment in the first four years. Given that most public health faculty startup packages are in the $100K - $200K range, we have a
strong opportunity for continued growth to expand our existing extensive faculty in the developing focus areas. While the majority of new faculty needed to support the MPH program have already been recruited and have started; the MPH program already has the resources committed to support recruitment of an additional 3 faculty over the period of FY19/20 – FY21/22 with faculty startup and FTE to support building out more concentrations; as well, the Biostatistics program will support recruitment of 1 - 2 non-Ladder rank faculty startups with existing support commitments over the budget projection period.

State funded FTEs support individual faculty for teaching, research, and service. Faculty Teaching FTEs numbers include a per-FTE percentage of state funded FTEs as dedicated to teaching, FTEs supported by the MPH revenues, and Temp FTE model effort across the degree programs supporting teaching by non-Ladder Rank faculty (In-Residence, Adjunct, Clinical X, and HS Clinical). Faculty State FTE Research & Service includes per-FTE percentage of state funded FTEs as dedicated to research and service. Finally, the Faculty Headcount numbers include only primary appointed, salaried faculty projected to be in the SPH. FTE funded faculty comprise the core faculty needed to support our educational programs and mission. Health Sciences has long had a significant number of non-Ladder Rank faculty research and clinical faculty. These faculty desire the opportunity to teach and engage in the educational mission and with students through classroom teaching, research projects for undergraduates, and mentoring and funding graduate students, and need teaching activity for academic advancement. They are an augmenting component of our teaching and are supported for their service using the Temp FTE model (per course pay).

As has been successful in Health Sciences (FMPPH and SSPPS), the SPH will engage in open Chancellor supported joint-appointment faculty recruitments in cross-campus, cross-discipline, and other campus level strategic plan initiatives. These supported, joint-appointment recruitments are a strong opportunity for the school to increase our educational and research collaboration and increase resources to the school.

Potential collaborative degree programs will largely leverage existing faculty resources and curricular offerings where feasible depending on the interdisciplinary link between existing programs. MOUs, such as that established between Health Sciences and Social Sciences regarding an MA in Global Health, will be established to provide a documented platform for sharing faculty, staff, and other resources needed for such potential programs.

<table>
<thead>
<tr>
<th>Staff FTE</th>
<th>FY17/18</th>
<th>FY18/19</th>
<th>FY19/20</th>
<th>FY20/21</th>
<th>FY21/22</th>
<th>FY22/23</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff FTE</td>
<td>28.0</td>
<td>28.7</td>
<td>29.3</td>
<td>31.1</td>
<td>31.1</td>
<td>31.1</td>
<td>Core School staff only, no research funded</td>
</tr>
</tbody>
</table>

Twenty-eight Public Health oriented administrative staff FTE exist in FMPPH and GPH programs, including educational programs staff. The FMPPH administrative division is appropriately staffed and provides effective services in funds management, academic affairs, faculty compensation, general administrative faculty support, space and facilities, employee engagement, coordination of educational programs, student advising, and more. The positive environment and strength of our administrative team has enabled us to recruit very strong candidates from multiple other departments and central offices when we’ve had openings, including over others’ retention efforts. With the projected growth over the next 2 years, we expect to add one staff position by the opening of the school. The staff will include: administrative assistants for the Deans and faculty, program coordinators and student advisors for the various education programs, finance and operations, academic personnel, HR, and IT. The Wertheim endowment and other funds will enable two additional staff positions: an educational division MSO and a PR / marketing position. See organizational chart in Appendix B.

Non-administrative staff, i.e., staff funded by research and other faculty-generated programs, are not included directly in the budget. There are currently over 200 non-administrative staff. Health Sciences HR
Shared Services fees associated with these staff are captured as a School expense and are covered by grant & contract IDC and service agreement and self-supporting revenue tax assessments.

**Non-Personnel Expenses:** General non-personnel expense is categorized as Health Sciences Shared Services fees, supplies, professional student financial support, and other. Health Sciences Shared Services fees are costs associated with central administration units that provide support to Departments and Schools within Health Sciences for academic personnel services, human resources, IT, and grants administration. Each unit has a fee schedule based on type of service provided, per FTE for most and for grants administration per proposals and dollars managed. IT Shared Service per FTE costs are direct billed to salary funding sources; thus, the school core funds only cover the associated costs for administrative staff FTEs and Ladder-Rank faculty FTEs, while research funds cover research personnel and faculty research effort. Other expenses consists of 415m restoration plan assessment and Biostatistics degree programs financial aid and diversity spending. Professional Student Financial Support consists of MPH program sponsored scholarships to California resident students and diversity initiative supported students as indicated in the approved MPH degree proposal and Wertheim endowment supported scholarships for MPH students.

**Library:** The School of Public Health will leverage existing UCSD libraries, most notably the Biomedical Library on the Health Sciences area of campus and the main Geisel Library located centrally. UCSD and Health Sciences have extensive online access to research collections, journals, and other publications. Students and faculty will be provided with convenient access to librarians who have special expertise in the literature of subjects covered in the school’s curriculum, including print and electronic resources. Research conducted by Public Health faculty, students, and staff typically utilizes electronic databases and journals and print materials available in the libraries and does not ordinarily have special requirements.

**Financial Aid:** As noted above and as reviewed and approved for the self-supporting MPH program, financial aid support consists of revenue return-to-aid scholarships to California resident students and diversity initiative supported students (> 20% projected). The Biostatistics graduate program will provide modest revenue return to aid (> 10% projected), particularly focused on diversity and underrepresented populations in mathematics, biostatistics, and statistics. Teaching Assistant opportunities are available for our PhD students, and there will also be TA opportunities for our MPH and Biostatistics MS students. Also, as described, a significant portion of the Wertheim endowment is in support of scholarships and fellowships.

**New Faculty Recruitment & Startup:** The budgeted and committed $2.5M in recruitment and startup funds over the first four years provides the SPH strong opportunity for continued growth to expand our existing extensive faculty in the developing focus areas. Building on the expected migration of approximately 100 current faculty into the SPH, moderate growth of 2 – 4 faculty per year is projected. Resources for recruitment and startup packages are supported by four years of $500K per year from the VCHS, the five endowed professorships provided by the Chancellor, the MPH program, and Division of Biostatistics recruitment reserves. As evidenced by the positive bottom line growth after the first few years and the growth of the Wertheim endowment funds and their increased use for faculty recruitment and startup past the fourth year (there will be more focus on school – level staffing for the first four years from this component of the endowment, but that focus will shift to faculty recruitment), there will be ample resources for recruitment and startup beyond year four and the VCHS’s commitment.

**Sources of Revenue**

**Existing Resources**

**Campus General Funds:** Consists of existing state-funded faculty FTE dollars associated with 26.5 Health Sciences FTEs, 3.5 EVC-AA FTEs dedicated to the BSPH, and the volume based allocations from the EVC related to the BSPH operational budget. Tuition and fees allocation from the EVC for the state-supported Biostatistics MS program is included following the revenue sharing model as set forth by the Chancellor. No
new FTEs are requested from the state for this proposal, and no new additional FTE internal requests are anticipated until deemed necessary through various collaborative efforts as the SPH continues to mature.

**Self-Supporting Degree Fees:** Fees are projected based on the MPH proposal and up-to-date revenue and expense projections for the program. The MPH is a self-supporting program following the revenue sharing model as set forth by the Chancellor for self-supporting Masters’ programs.

**Indirect Cost Recovery:** Indirect costs derived from the existing and growing research portfolio (FMPH and GPH) will continue to be a primary revenue source for the school. The IDC return to the school is expected to be at least 20%. 20% IDC return projections equate to $1.5M at School start in FY19/20, growing to $1.75M by FY22/23.

**Revenue Assessments:** Existing Public Health faculty generate revenue through various activities such as service agreements, recharge centers, and consulting arrangements. Such revenues are assessed for overhead which will contribute towards funding the operations of the school.

**Other:** Other revenue streams include contract revenues from SDSU for the two JDPs, existing commitments from the Vice Chancellor for Health Sciences, and institutional block grants.

**Philanthropy:** The Dr. Herbert and Nicole Wertheim annual payouts the School’s operational budget.

**Federal and Private Research Funding:** Although not included in the operating budget, the SPH’s research portfolio is expected to be approximately $160M+ in total direct costs funding at opening based upon existing FMPH and GPH awards.

**Capital Requirements – The Physical Home for the UC San Diego School of Public Health**

**Near and Intermediate Term – Existing Resources**

The Department of FMPH and the Division of GPH faculty, educational programs, and research are centered in Health Sciences with some faculty and their research programs located in the QI / Calit2, SIO, on main campus, and in some community locations. Until a new SPH building is built, the school will reside within existing Health Sciences and campus space. The HS Vice Chancellor’s Office (VCO) has provided FMPH with space to accommodate the faculty hired for the MPH and is working with campus to identify and allocate incremental space as needed for growth. While already fairly concentrated in adjacent buildings on the Health Sciences neighborhood of campus, upon approval of the school, the Vice Chancellor will implement an effort to increase collocation of the school’s faculty, educational programs, and administration.

**New Building Goal – with Philanthropic Support**

As described above, the campus Development Office, working with the Vice Chancellor for Health Sciences, is actively pursuing additional donors for the SPH endowment. They have also begun plans for the drive to raise the primary funds for a building. A building may also be partially funded by an IDC supported debt-service model based on grants and contracts taking place in the building.

Projections to singularly house the SPH require an 83,000 ASF mixed use facility. The building will house offices, open office space, conference rooms, office support space, etc. for faculty, administration including School housed student services, programs, and dry lab research space, comprising 55,700 ASF. Public health research is primarily dry lab in nature and accounts for a significant portion of this space. The few wet laboratories needed for our faculty research programs will be housed in adjacent Health Sciences buildings. Adding wet lab facilities to a building adds considerable complexity and cost and will not be included in the
SPH building. The facility will include 7,300 ASF of student work/study/conference areas, community and wellness centers, a large flex conference / event space, and open lobby space. Auditoria, classrooms, and small group instructional spaces will comprise the remaining 20,000 ASF.

The building has an estimated total gross area of 136,000 sq. ft. and cost of $60M - $70M. As noted, a philanthropic gift is the primary means of support for construction of this facility, while IDC supported debt-service may be included in the funding model. The building is expected to be on the main UCSD campus within the Health Sciences neighborhood. The Health Sciences neighborhood includes a restaurant, a coffee shop, the Biomedical Library, as well as 13 major buildings comprising the main campus cores of the Schools of Medicine and Pharmacy. Eleven smaller buildings are also in the neighborhood. Just completed and opened in the Health Sciences neighborhood is a 1,300+ space parking structure that has greatly increased parking to further serve that area of campus.

Given the value of limited ground space for buildings, preliminary discussions have included the concept of building a facility considerably larger than projected for the SPH’s mid-term future needs. This additional size would be funded by non-SPH sources and could house other Health Sciences office, dry lab, and instructional space. Such a plan would maximally utilize the campus and provide for a larger building that could accommodate further School of Public Health growth farther into the future. The non-SPH programs and occupants would be moved to other / new locations as needed over time, and the SPH would assume costs for the additional ASF.

**PLAN FOR PHILANTHROPIC CAMPAIGN**

As established in our pre-proposal, the UCSD Development Office and the Health Sciences Advancement Office have been charged by the Chancellor and the Vice Chancellor for Health Sciences to raise funds for the SPH to establish an endowment for the school and raise the capital for a new building. The expectation is to reach a total philanthropic target of $100M comprised of a $50M endowment and a minimum of $50M towards a new building. Philanthropy and fund raising will be a priority for the school, Health Sciences, and University leadership and will amplify the school’s ability to educate, contribute to improving the public’s health, and conduct high impact and actionable Public Health research. At the time of the pre-proposal, we were pursuing a lead gift of $25M towards the $100M goal. As discussed above, UCSD received a $25M gift from Dr. Herbert and Nichole Wertheim (henceforth referred to as the ‘Wertheim Gift’), with a first installment payment received in October, 2018. This generous gift comprises half of the $50M endowment goal.

As described in the Development Plan below, UCSD Development and Health Sciences Advancement have created lists of potential new donors towards the additional targeted $25M endowment and $50M for capital development. Following the Wertheim gift, the UC San Diego Foundation has created six new public health endowment funds that will support the current public health program and future SPH. These giving opportunities are listed and publicized on the “UCSD Giving” and “Campaign for UC San Diego” websites.

UCSD recognizes the considerable positive impact the Wertheim gift and prospective UC approval for the SPH will have on attracting future philanthropy. Importantly, Dr. Wertheim is personally committed to vigorously seeking other donors to support the SPH. He has made this express commitment in the gift agreement. Dr. Wertheim has already demonstrated his ability to encourage other philanthropists to give towards the schools for which he gave the founding gift. He has done this for the University of Florida (UF) Herbert Wertheim College of Engineering, the Herbert Wertheim College of Medicine at Florida International University, and the Nicole Wertheim College of Nursing and Health Sciences at Florida International University. After providing the naming gift for the UF College of Engineering, Dr. Wertheim actively participated in the philanthropic plan by attracting other donors towards an additional $250M of funding. Specific to the beginnings of Dr. Wertheim’s advocacy for the UCSD SPH, he has shared the goal of the UC San Diego School of Public Health with other philanthropists. Dr. and Mrs. Wertheim are
members of the Giving Pledge and have discussed supporting UCSD SPH directly with other members of Giving Pledge. In another example, Dr. Wertheim informed fellow members of the advisory board of another (non-educational) organization of his intention to give a founding gift for a UCSD SPH and made clear that he would exhort them to contribute. The Wertheim’s advocacy and efforts pursuing additional donors will be of great value, including in attracting donors who live outside San Diego and California.

A specific opportunity for philanthropy is leveraging the Chancellor’s generous contribution of five $1M endowed professorships aimed at joint or collaborative positions with other disciplines in Health Sciences, the Scripps Institution of Oceanography, Engineering, and the General Campus. Potential donors could be offered the option of adding $2 - 3M of gift to a professorship to establish a named Endowed Chair. We will also seek a gift to name an Endowed Chair for the Dean of the School of Public Health. An Endowed Chair for the Dean will contribute to the attraction of the highest caliber candidates and free school operational funds for other needs such as staffing and other faculty leadership appointments. Other SPH leadership positions such as the Associate Deans for Education and Research are other potentials with similar benefits to the school’s reputation and finances.

The naming of the new SPH building will target the primary capital gift. In addition, there are sizable opportunities for naming gifts contributing to the fundraising for the new building, such as the planned building components of the Center for Community Engagement and the Student, Staff, and Faculty Wellness Center.

The Chancellor and the Vice Chancellor for Health Sciences are energized in their support for the UC San Diego School of Public Health and provide a significant prioritization and drive for the UCSD Development Office and Health Sciences Advancement to aggressively pursue a campaign of fund raising for the SPH. Approval for the school will greatly propel this effort and public interest. Further, the new Dean of the SPH will also have a charge of pursuing philanthropy in support of the school’s missions and operations.

**Development Plan for Public Health Initiative**

As we look to complete an unprecedented campaign for public health at UC San Diego, we are committed to raising funds both for a building to house public health, and to support faculty research and educational initiatives. Transformational gift prospects will be required for the capital construction of a building. No transformational prospects have yet been identified for this project. Development staff will partner closely with top faculty and UC San Diego leadership to complete this campaign. We are also likely to initiate a volunteer philanthropic board to provide philanthropic support as well as connect us to additional philanthropists. This is likely to be led by the Wertheims.

In addition to a transformational gift to construct a new home for the public health initiative, we seek a great deal of support for faculty, research, and education. UC San Diego has a history of modest support to public health projects, researchers, and leaders. These donors include individuals, organizations, and some pharmaceutical companies. We have identified many additional potential prospects, with varying degrees of affiliation with UC San Diego. Our prospect research also includes individuals and organizations that may be associated with our lead donors, Dr. and Mrs. Wertheim, specifically through the Giving Pledge. Within these parameters, we have identified potential prospects with the following results:

<table>
<thead>
<tr>
<th>Major Giving Capacity</th>
<th>Number of Prospects</th>
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<tbody>
<tr>
<td>$1M+</td>
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</tr>
<tr>
<td>$500K - $1M</td>
<td>5</td>
</tr>
<tr>
<td>$250K - $500K</td>
<td>15</td>
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<tr>
<td>$100K - $250K</td>
<td>21</td>
</tr>
<tr>
<td>$25K - $100K</td>
<td>40</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Capital prospects</th>
<th>Giving Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wertheim Foundation</td>
<td>$20M - $25M</td>
</tr>
<tr>
<td>Doug Manchester</td>
<td>$10M - $25M</td>
</tr>
<tr>
<td>Research/Education prospects</td>
<td>Project</td>
</tr>
<tr>
<td>------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Gates Foundation</td>
<td>Gender &amp; Equity, Dr. Raj</td>
</tr>
<tr>
<td>Warren Buffett</td>
<td>TBD</td>
</tr>
<tr>
<td>Reena Horowitz</td>
<td>TBD</td>
</tr>
<tr>
<td>Ruth Westreich</td>
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</tr>
<tr>
<td>Leichtag Foundation</td>
<td>TBD</td>
</tr>
<tr>
<td>William H. Gates</td>
<td>TBD</td>
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</tbody>
</table>

2018-2019
- In coordination with School of Public Health proposal submission, develop a refined prospect and fundraising strategy to include a diverse pool of individual donors, corporations, and foundation prospects
- Appoint advisory board with intention to capitalize on volunteer leadership in philanthropic support
- Create case statements, materials, and marketing to enhance fundraising efforts
- Devote fundraising staffing resources to build out strategy and implementation
- Stewardship for Wertheim family including a campus appreciation event for the philanthropic support
- Peer screening of the Wertheim family connections and build out strategies for individual prospects
- Stewardship reporting to the donor
- Anticipated UC approval for the School of Public Health

2019-2020
- Prepare for potential public phase of a named school and coordination of activities for naming approvals, marketing, communication, donor and prospect engagement
- Public announcement of the school
- Campus celebration including lectureship and community healthcare conference
- Launch of academic programs with public facing appeal to engage potential prospects and community advocates
- Finalize plans for potential capital project and strategy for physical infrastructure
- Begin to identify lead donors for potential priority areas for the proposed school including building naming gift
- Lead prospects for capital project targeted with VIP experiences on campus
- Stewardship reporting to the donor
- Target student and educational programmatic priorities for targeted fundraising
- Bi-annual board of advisors meetings

2020-2021
- Lead donor for building naming solidified
- Campus moves forward with recommended capital project plans with a secured lead gift for the new physical home of the school
- Stewardship reporting to the donor
- Focus on physical infrastructure and academic teaching fundraising priorities
- Bi-annual board of advisors meetings

2021-2023
- Begin negotiations with potential donors on building naming, floors, and other physical spaces
- Continue to seek investment in educational and programmatic priorities
- Stewardship reporting to the donor
- Bi-annual board of advisors meetings
REFERENCES

i Centers for Disease Control 2013
iii County of San Diego Health and Human Services Agency, Public Health Services, Community Health Statistics Unit. 3-4-50: Chronic Disease in San Diego County, Oct 2010.
vi Centers for Disease Control, Modernizing the Workforce for the Public’s Health: Shifting the Balance, August 2013.
xCited in Office of Statewide Health Planning and Development, California Workforce Investment Board, Health Workforce Development Council, Career Pathway Subcommittee, Updated Report, September 2012.
# APPENDIX A: ACKNOWLEDGEMENTS

## Executive Council

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Douglas Ziedonis, MD, MPH</td>
<td>Associate Vice Chancellor, Health Sciences Department of Psychiatry</td>
</tr>
<tr>
<td>(Chair, Executive Council)</td>
<td></td>
</tr>
<tr>
<td>Robert S. Ross, MD</td>
<td>Assistant Vice Chancellor, HS Academic Affairs Department of Medicine</td>
</tr>
<tr>
<td>(Vice Chair, Executive Council)</td>
<td></td>
</tr>
<tr>
<td>Cheryl Anderson, PhD, MPH, MS</td>
<td>Department of Family Medicine &amp; Public Health, Interim Department Chair</td>
</tr>
<tr>
<td>Gert Cauwenberghs, PhD</td>
<td>Jacobs School of Engineering Department of Bioengineering</td>
</tr>
<tr>
<td>Rajesh Gupta, PhD</td>
<td>Department of Computer Science and Engineering, Qualcomm Endowed Chair</td>
</tr>
<tr>
<td>Josh Graff Zivin, PhD</td>
<td>Department of Economics &amp; School of Global Policy &amp; Strategy, Associate Dean of Faculty Affairs</td>
</tr>
<tr>
<td>Rick Kronick, PhD</td>
<td>Department of Family Medicine &amp; Public Health</td>
</tr>
<tr>
<td>Chris Longhurst, MD, MS</td>
<td>Department of Medicine-Biomedical Informatics UC San Diego Health, CIO</td>
</tr>
<tr>
<td>Guy Masters, PhD</td>
<td>Scripps Institution of Oceanography, Director of Research</td>
</tr>
<tr>
<td>Craig McKenzie, PhD</td>
<td>Rady School of Management and Department of Psychology</td>
</tr>
<tr>
<td>Don Norman, PhD</td>
<td>The Design Lab, Director</td>
</tr>
<tr>
<td>Kevin Patrick, MD, MS</td>
<td>Department of Family Medicine &amp; Public Health</td>
</tr>
<tr>
<td>Valerie Ramey, PhD</td>
<td>Department of Economics</td>
</tr>
<tr>
<td>Robert Schooley, MD</td>
<td>Department of Medicine</td>
</tr>
<tr>
<td>Murray Stein, MD, MPH</td>
<td>Departments of Psychiatry and Family Medicine &amp; Public Health</td>
</tr>
<tr>
<td>Steffanie Strathdee, PhD</td>
<td>Department of Medicine-Global Public Health, Harold Simon Professor</td>
</tr>
<tr>
<td>Tracy Handel, PhD</td>
<td>Skaggs School of Pharmacy and Pharmaceutical Sciences Department of Pharmacology</td>
</tr>
<tr>
<td>Mary Walshok, PhD</td>
<td>University Extension, Dean Associate Vice Chancellor of Public Programs</td>
</tr>
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### Advisory Committee

<table>
<thead>
<tr>
<th>Name</th>
<th>Department/Position</th>
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</thead>
<tbody>
<tr>
<td>Wael Al-Delaimy, MD, PhD</td>
<td>Family Medicine &amp; Public Health-Global Health, Chief</td>
</tr>
<tr>
<td>Matthew Allison, MD, MPH</td>
<td>Family Medicine &amp; Public Health-Preventive Medicine, Interim Chief</td>
</tr>
<tr>
<td>Bobb Barile</td>
<td>Assistant Dean, Education Administration</td>
</tr>
<tr>
<td>Cinnamon Bloss, PhD</td>
<td>Psychiatry &amp; Family Medicine &amp; Public Health</td>
</tr>
<tr>
<td>Kimberly Brouwer, PhD</td>
<td>Family Medicine &amp; Public Health, Vice Chair for Public Health Education</td>
</tr>
<tr>
<td>Jennifer Burney, PhD</td>
<td>School of Global Policy &amp; Strategy</td>
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<tr>
<td>Tina Chambers, PhD, MPH</td>
<td>Pediatrics</td>
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<tr>
<td>Harvey Checkoway, PhD</td>
<td>Family Medicine &amp; Public Health, Vice Chair for Research</td>
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<tr>
<td>Jeffrey Clemens, PhD</td>
<td>Economics</td>
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<tr>
<td>Todd Coleman, PhD</td>
<td>Jacobs School of Engineering- Bioengineering</td>
</tr>
<tr>
<td>Cathy Constable, PhD</td>
<td>Scripps Institution of Oceanography</td>
</tr>
<tr>
<td>Peter Cowhey, PhD</td>
<td>Interim Executive Vice Chancellor</td>
</tr>
<tr>
<td>Thomas Csordas, PhD</td>
<td>Anthropology-Global Health Program, Director</td>
</tr>
<tr>
<td>Jeff Elman, PhD</td>
<td>Cognitive Science &amp; Data Science Institute</td>
</tr>
<tr>
<td>Fonna, Forman, PhD, JD</td>
<td>Political Science</td>
</tr>
<tr>
<td>James Fowler, PhD</td>
<td>Political Science</td>
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<tr>
<td>Todd Gilmer, PhD</td>
<td>Family Medicine &amp; Public Health-Health Policy, Chief</td>
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<tr>
<td>Linda Hill, MD, MPH</td>
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<td>Dilip Jeste, MD</td>
<td>Psychiatry</td>
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<td>Gene Kallenberg, MD</td>
<td>Family Medicine &amp; Public Health-Family Medicine, Chief</td>
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<tr>
<td>Andrea LaCroix, PhD</td>
<td>Family Medicine &amp; Public Health-Epidemiology, Chief</td>
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<tr>
<td>Kim Chi Le</td>
<td>Assistant Director, Campus Budget Office</td>
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<tr>
<td>Sylvia Lepe</td>
<td>Assistant Vice Chancellor, Campus Budget Office</td>
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<tr>
<td>Bess Marcus, PhD</td>
<td>Family Medicine &amp; Public Health, Chair</td>
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<tr>
<td>Elena Martinez, PhD, MPH</td>
<td>Family Medicine &amp; Public Health</td>
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<tr>
<td>Karen Messer, PhD</td>
<td>Family Medicine &amp; Public Health-Biostatistics, Chief</td>
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<tr>
<td>Paul Mills, PhD</td>
<td>Family Medicine &amp; Public Health-Behavioral Medicine, Interim Chief</td>
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<tr>
<td>Bradley Moore, PhD</td>
<td>Scripps Institution of Oceanography</td>
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<tr>
<td>Loki Natarajan, PhD</td>
<td>Family Medicine &amp; Public Health</td>
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<tr>
<td>Lucila Ohno-Machado, MD, PhD</td>
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<tr>
<td>Keith Pezzoli, PhD</td>
<td>Urban Studies</td>
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64
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<tr>
<td>Michael Pratt, MD, MPH</td>
<td>Family Medicine &amp; Public Health</td>
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<tr>
<td>Anita Raj, PhD</td>
<td>Medicine &amp; Global Public Health</td>
</tr>
<tr>
<td>Steve Ross</td>
<td>Associate Vice Chancellor, Resource Administration</td>
</tr>
<tr>
<td>Jim Sallis, PhD</td>
<td>Family Medicine &amp; Public Health</td>
</tr>
<tr>
<td>Mia Savoia, MD</td>
<td>School of Medicine-Medical Education, Dean</td>
</tr>
<tr>
<td>Barbara Sawrey, PhD</td>
<td>AVC-Academic Affairs/Dean-Undergraduate Education</td>
</tr>
<tr>
<td>Geert Schmid-Schoenbein, PhD</td>
<td>Jacob School of Engineering- Bioengineering, Chair</td>
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<tr>
<td>David Strong, PhD</td>
<td>Family Medicine &amp; Public Health</td>
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<td>Denis Trinidad, PhD</td>
<td>Family Medicine &amp; Public Health</td>
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<tr>
<td>Jennifer Vanos, PhD</td>
<td>Family Medicine &amp; Public Health &amp; Scripps Institution of Oceanography</td>
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**Pre-Proposal Development Administrative Team**

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<td>Douglas Ziedonis, MD, MPH</td>
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<td>Assistant Vice Chancellor, Health Sciences Academic Affairs</td>
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<td>Angela Ballantyne, PhD</td>
<td>Family Medicine &amp; Public Health</td>
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<td>Randy Brooks, MBA</td>
<td>Family Medicine &amp; Public Health, Vice Chair for Administration</td>
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<tr>
<td>Jay Covell, MPH</td>
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<tr>
<td>Agnes Flanagan, MBA</td>
<td>Vice Chancellor, Health Sciences Office</td>
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<tr>
<td>Jane Milner-Mare, MBA</td>
<td>Family Medicine &amp; Public Health</td>
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<tr>
<td>Rebecca Woolston, EdD, MA</td>
<td>Vice Chancellor, Health Sciences Office</td>
</tr>
</tbody>
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APPENDIX B: ORGANIZATIONAL STRUCTURES

UC San Diego Health Sciences Schools
School of Public Health: Potential Leadership Structure

- **Dean**
  - **Associate Dean for Education**
  - **Associate Dean for Academic Affairs**
  - **Division Leaders**
  - **Assistant Dean for Business Administration and Fiscal Affairs**
  - **Associate Dean for Research**
  - **Research Centers of Excellence Directors**
School of Public Health: Potential Administrative Structure
APPENDIX C: FRAMEWORK FOR THE PROPOSED UCSD SCHOOL OF PUBLIC HEALTH

### Figure 1. Framework for the UCSD’s Proposed School of Public Health

Learners and research will be grounded in the Five Core traditional public health competencies shown in **Yellow**, and in a matrixed manner also have an opportunity to focus on one of the Five Contemporary (21st century) topical areas shown in **White**. All students will be expected to develop knowledge and skills in the cross-cutting perspectives that will be relevant for all areas of study and research shown vertically in **Grey**.

<table>
<thead>
<tr>
<th>FIVE CORE PUBLIC HEALTH COMPETENCIES</th>
<th>ETHICS, HISTORY, &amp; SOCIETY</th>
<th>DATA SCIENCES &amp; DESIGN THINKING</th>
<th>BUSINESS &amp; PUBLIC HEALTH LEADERSHIP</th>
<th>TECHNOLOGY &amp; ENGINEERING</th>
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<td>Health Systems &amp; Policy</td>
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<td>Social and Behavioral Sciences</td>
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<table>
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<td>Climate Change, Earth, &amp; Health</td>
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<td>Women, Gender, &amp; Health</td>
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APPENDIX C-I: CURRENT HEALTH SCIENCES PUBLIC HEALTH DEGREE PROGRAMS AND CURRICULAR OFFERINGS (to be in SPH)

Bachelor of Science in Public Health

Program Description

The Department of Family Medicine and Public Health offers a Bachelor of Science degree in Public Health (BSPH) with courses in epidemiology, biostatistics, social and behavioral sciences, environmental and occupational health sciences, and health policy. The epidemiology and biostatistics areas offer courses on the determinants and distribution of disease at the population level with a focus on analyzing and interpreting public health data using statistical methods. The social and behavioral sciences area offers courses for students interested in how behaviors influence disease. The environmental and occupational health sciences area offers courses on the study of environmental and occupational factors including biological, physical and chemical factors that affect the health of a workforce and the community. The health policy area emphasizes the structure, process, and outcomes of health services and policies that are commonly used to motivate people to healthier lifestyles.

Degree Requirements

<table>
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<tr>
<th>LOWER DIVISION (32-33 UNITS)</th>
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<td>Course Title</td>
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<tr>
<td>Public Health Sciences</td>
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<td>Biology</td>
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<tr>
<td>Quantitative Methods</td>
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<td>Social and Behavioral Science Electives</td>
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</table>

<table>
<thead>
<tr>
<th>UPPER DIVISION (52-56 UNITS)</th>
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<tr>
<td>Course Title</td>
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<td>Public Health Core Disciplines</td>
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<tr>
<td>Public Health Electives</td>
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</tr>
<tr>
<td>Capstone Experience Or Honors Practicum Program</td>
<td>8</td>
</tr>
<tr>
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<td></td>
</tr>
</tbody>
</table>

Current List of BSPH Degree Courses

A. BSPH Core Requirements

LOWER-DIVISION Required Courses for the Public Health Major

1. Public Health Sciences courses (8 units required)
FMPH 40. Introduction to Public Health (4): This course provides an introduction to the infrastructure of public health; the analytical tools employed by public health practitioners; biopsychosocial perspectives of public health problems; health promotion/disease prevention; quality assessment in public health; and legal and ethical concerns.

FMPH 50. Primary Care and Public Health (4): This course explores historical and current interactions, achievements and challenges of primary care and public health. It will analyze the impact of common medical conditions such as obesity, diabetes, mental health disorders, and others on individuals, their families, and society.

2. Biology course options (12 units required)

BILD 1. The Cell (4): An introduction to cellular structure and function, to biological molecules, bioenergetics, to the genetics of both prokaryotic and eukaryotic organisms, and to the elements of molecular biology. **Prerequisites:** Chem 6A; Chem 6B may be taken concurrently.

BILD 2. Multicellular Life (4): An introduction to the development and the physiological processes of plants and animals. Included are treatments of reproduction, nutrition, and respiration, and transport systems, regulation of the internal environment, the nervous system, and behavior. **Prerequisites:** BILD 1.

BILD 3. Organismic and Evolutionary Biology (4): The first principles of evolutionary theory, classification, ecology, and behavior; a phylogenetic synopsis of the major groups of organisms from viruses to primates. **Prerequisites:** none. **Note:** EBE majors should complete this course during their first year at UC San Diego.

BILD 10. Fundamental Concepts of Modern Biology (4): An introduction to the biochemistry and genetics of cells and organisms; illustrations are drawn from microbiology and human biology. This course is designed for nonbiology students and does not satisfy a lower-division requirement for any biology major. Open to nonbiology majors only. Exclude the following major codes: BI28, BI29, BI30, BI31, BI32, BI33, BI34, BI35, and BI36. **Note:** Students may not receive credit for BILD 10 after receiving credit for BILD 1.

BILD 12. Neurobiology and Behavior (4): Introduction to the organization and functions of the nervous system; topics include molecular, cellular, developmental, systems, and behavioral neurobiology. This course is designed for nonbiology students and does not satisfy a lower-division requirement for any biology major. Open to nonbiology majors only. Exclude the following major codes: BI28, BI29, BI30, BI31, BI32, BI33, BI34, BI35, and BI36.

BILD 20. Human Genetics in Modern Society (4): Fundamentals of human genetics and introduction to modern genetic technology such as gene cloning and DNA finger printing. Applications of these techniques, such as forensic genetics, genetic screening, and genetic engineering. Social impacts and ethical implications of these applications. This course is designed for nonbiology students and does not satisfy a lower-division requirement for any biology major. Open to nonbiology majors only. Exclude the following major codes: BI28, BI29, BI30, BI31, BI32, BI33, BI34, BI35, and BI36. **Note:** Students may not receive credit for BILD 20 after receiving credit for BICD 100.

BILD 22. Human Nutrition (4): A survey of our understanding of the basic chemistry and biology of human nutrition; discussions of all aspects of food: nutritional value, diet, nutritional diseases, public health, and public policy. This course is designed for nonbiology students and does not satisfy
a lower-division requirement for any biology major. Open to nonbiology majors only. Exclude the following major codes: BI28, BI29, BI30, BI31, BI32, BI33, BI34, BI35, and BI36. **Note:** Students may not receive credit for BILD 22 after receiving credit for BIBC 120.

**BILD 26. Human Physiology (4):** Introduction to the elements of human physiology and the functioning of the various organ systems. The course presents a broad, yet detailed, analysis of human physiology, with particular emphasis towards understanding disease processes. This course is designed for nonbiology students and does not satisfy a lower-division requirement for any biology major. Open to nonbiology majors only. Exclude the following major codes: BI28, BI29, BI30, BI31, BI32, BI33, BI34, BI35, and BI36. **Note:** Students may not receive credit for BILD 26 after receiving credit for BIPN 100.

**COGS 17. Neurobiology of Cognition (4):** Introduction to the organization and functions of the nervous system. Topics include molecular, cellular, developmental, systems, and behavioral neurobiology. Specifically, structure and function of neurons, peripheral and central nervous systems, sensory, motor, and control systems, learning and memory mechanisms. (Students may not receive credit for both Biology 12 and Cognitive Science 17. This course fulfills general-education requirements for Marshall and Roosevelt Colleges as well as Warren by petition.)

3. **Quantitative Methods course options (4 or 5 units required)**

**COGS 14B. Introduction to Statistical Analysis (4):** Introduction to descriptive and inferential statistics. Tables, graphs, measures of central tendency and variability. Distributions, Z-scores, correlation, regression. Probability, sampling, logic of inferential statistics, hypothesis testing, decision theory. T-test, one and two-way Anova, nonparametric tests (Chi-square). **Prerequisites:** Cognitive Science 14A.

**MATH 11. Calculus-Based Introductory Probability and Statistics (5):** Events and probabilities, conditional probability, Bayes’ formula. Discrete random variables: mean, variance; binomial, Poisson distributions. Continuous random variables: densities, mean, variance; normal, uniform, exponential distributions, central limit theorem. Sample statistics, confidence intervals, hypothesis testing, and regression. Applications. Intended for biology and social science majors. **Prerequisites:** AP Calculus BC score of 3, 4, or 5, or Math 10B or Math 20B.

**PSYC 60. Introduction to Statistics (4):** This course provides an introduction to both descriptive and inferential statistics, core tools in the process of scientific discovery and the interpretation of research.

4. **Social and Behavioral Science course options (8 units required)**

**ANTH 1. Introduction to Culture (4):** An introduction to the anthropological approach to understanding human behavior, with an examination of data from a selection of societies and cultures.

**ANTH 2. Human Origins (4):** An introduction to human evolution from the perspective of physical anthropology, including evolutionary theory and the evolution of the primates, hominids, and modern humans. Emphasis is placed on evidence from fossil remains and behavioral studies of living primates. Prerequisite for upper-division biological anthropology courses.

**ANTH 23. Debating Multiculturalism: Race, Ethnicity, and Class in American Societies (4):** This course focuses on the debate about multiculturalism in American society. It examines the
interaction of race, ethnicity, and class, historically and comparatively, and considers the problem of citizenship in relation to the growing polarization of multiple social identities.

CGS 2B. Introduction to Critical Gender Studies: Gender and Institutions (4): This course examines how gender organizes and is organized by institutions. Domains of inquiry may include family, education, medicine, technology, law, media, the workplace, immigration, and citizenship.


COMM 10. Introduction to Communication (4): Introduction to the history, theory, and practice of communication, including language and literacy, representation and semiotics, mediated technologies and institutional formations, and social interaction. Integrates the study of communication with a range of media production (for example, writing, electronic media, film, performance). Students will not receive credit for COGN 20 and COMM 10. COMM 10 may be taken concurrently with the COMM A, B, C courses and intermediate electives. Course is offered fall, winter, and summer quarters.

ECON 1. Principles of Microeconomics (4): Introduction to the study of the economic system. Course will introduce the standard economic models used to examine how individuals and firms make decisions in perfectly competitive markets, and how these decisions affect supply and demand in output markets.

ENVR 30. Environmental Issues: Natural Sciences (4): Examines global and regional environmental issues. The approach is to consider the scientific basis for policy options. Simple principles of chemistry and biology are introduced. The scope of problems includes: air and water pollution, climate modification, solid waste disposal, hazardous waste treatment, and environmental impact assessment. Prerequisites: none.

ESYS 10. Introduction to Environmental Systems (4): This course explores the interdisciplinary character of environmental issues through an examination of a particular topic (climate change, for example) from numerous disciplinary perspectives (e.g., biology, chemistry, physics, political science, and economics). Prerequisites: none.

HDP 1. Introduction to Human Development (4): This course introduces students to the central issues in the basic areas in human development. The course will explain relationships between biological, cognitive, social, and cultural aspects of development across the life span.

HILD 30. History of Public Health (4): Explores the history of public health, from the plague hospitals of Renaissance Italy to the current and future prospects for global health initiatives, emphasizing the complex biological, cultural, and social dimensions of health, sickness, and medicine across time and space.

LTCS 50. Introduction to Cultural Studies (4): An introduction to cultural studies with a focus on the following areas: literary and historical studies, popular culture, women’s studies, ethnic studies, science studies, and gay/lesbian studies. Particular emphasis on the question of “cultural practices” and their social and political conditions and effects.
POLI 10 or 10D. Introduction to Political Science: American Politics (4): This course surveys the processes and institutions of American politics. Among the topics discussed are individual political attitudes and values, political participation, voting, parties, interest groups, Congress, presidency, Supreme Court, the federal bureaucracy, and domestic and foreign policy making. Poli Sci 10 is Lecture only, and Poli Sci 10D is Lecture plus Discussion section. These courses are equivalents of each other in regards to major requirements, and students may not receive credit for both 10 and 10D.

POLI 11 or 11D. Introduction to Political Science: Comparative Politics (4): The nature of political authority, the experience of a social revolution, and the achievement of an economic transformation will be explored in the context of politics and government in a number of different countries. Poli Sci 11 is Lecture only, and Poli Sci 11D is Lecture plus Discussion section. These courses are equivalents of each other in regards to major requirements, and students may not receive credit for both 11 and 11D.

PSYC 1. Psychology (4): This course provides an overview of the basic concepts in psychology. Topics may include human information processing, learning and memory, motivation, development, language acquisition, social psychology, and personality.

PSYC 2. General Psychology: Biological Foundations (4): This course provides an introductory survey of the relationship between human behavior and brain function. Specific areas of emphasis include vision and other sensory processes, memory, motivation, attention, and cognition.

PSYC 3. General Psychology: Cognitive Foundations (4): This course is an introduction to the basic concepts of cognitive psychology. Topics include perception, attention, memory, language, and thought. The relation of cognitive psychology to cognitive science and to neuropsychology is also covered.

PSYC 4. General Psychology: Behavioral Foundations (4): This course provides an introduction to behavioral psychology. Topics include classical conditioning, operant conditioning, animal learning, and motivation and behavior modification.

PSYC 6. General Psychology: Social Foundations (4): This course provides an introduction to social psychology. Topics may include emotion, aesthetics, behavioral medicine, person perception, attitudes and attitude change, and behavior in social organizations.

PSYC 7. General Psychology: Developmental Foundations (4): This course provides an introduction to theories and research results in developmental psychology, covering infancy through adulthood.

PSYC 70. Research Methods in Psychology (4): This course provides an overview of how to choose appropriate research methods for experimental and non-experimental studies. Topics may include classic experimental design and counterbalancing, statistical power, and causal inference in experimental and non-experimental settings. Prerequisites: Psychology 60 or equivalent.

SOCI 1. Introduction to Sociology (4): An introduction to the organizing themes and ideas, empirical concerns, and analytical approaches of the discipline of sociology. The course focuses on both classical and contemporary views of modern society, on the nature of community, and on inequality, with special attention to class, race, and gender. Materials include both theoretical statements and case studies. Will not receive credit for SOCI 1 and SOCL 1A.
**SOCI 2. The Study of Society (4)**: A continuation of Sociology/L 1A. The focus here is on socialization processes, culture, social reproduction and social control, and collective action. As in 1A, materials include both theoretical statements and case studies. While 1B may be taken as an independent course, it is recommended that students take 1A and 1B in sequence, as the latter builds on the former. Will not receive credit for SOCI 2 and SOCL 1B.

**SOCI 10. American Society: Social Structure and Culture in the U.S. (4)**: An introduction to American society in historical, comparative, and contemporary perspectives. Topics will include American cultural traditions; industrialization; class structure; the welfare state; ethnic, racial, and gender relations; the changing position of religion; social movements; and political trends. Will not receive credit for SOCI 10 and SOCL 10.

**SOCI 30. Science, Technology, and Society (4)**: A series of case studies of the relations between society and modern science, technology, and medicine. Global warming, reproductive medicine, AIDS, and other topical cases prompt students to view science-society interactions as problematic and complex. Will not receive credit for SOCI 30 and SOCL 30.

**SOCI 40. Sociology of Health-Care Issues (4)**: Designed as a broad introduction to medicine as a social institution and its relationship to other institutions as well as its relation to society. It will make use of both micro and macro sociological work in this area and introduce students to sociological perspectives of contemporary health-care issues. Will not receive credit for SOCI 40 and SOCL 40.

**SOCI 60. The Practice of Social Research (4)**: This course introduces students to the fundamental principles of the design of social research. It examines the key varieties of evidence, sampling methods, logic of comparison, and causal reasoning researchers use in their study of social issues. Will not receive credit for SOCI 60 and SOCL 60.

**SOCI 70. General Sociology for Premedical Students (4)**: This introductory course is specifically designed for premedical students and will provide them with a broad introduction to sociological concepts and research, particularly as applied to medicine.

**USP 2. Urban World System (4)**: Examines cities and the environment in a global context. Emphasizes how the world’s economy and the earth’s ecology are increasingly interdependent. Focuses on biophysical and ethicosocial concerns rooted in the contemporary division of labor among cities, Third World industrialization, and the post-industrial transformation of US cities.

**UPPER-DIVISION Required Courses for the Public Health Major**

1. **Required Public Health Core Discipline courses (24 units required)**

   **FMPH 101 Epidemiology (4)**: This course covers the basic principles of epidemiology, with applications to investigations of noninfectious (“chronic”) and infectious diseases. Explores various study designs appropriate for disease surveillance and studies of etiology and prevention. **Prerequisites:** FMPH 40; PSYC 60 or MATH 11; and upper-division standing.

   **FMPH 102 Biostatistics in Public Health (4)**: Fundamentals of biostatistics and basic methods for analysis of continuous and binary outcomes for one, two, or several groups. Includes: summarizing and displaying data; probability; statistical distributions; central limit theorem, confidence intervals, hypothesis testing; comparing means of continuous variables between two groups; comparing proportions between two groups; simple and multiple linear regression. Hands-on data analysis using
software and statistical applications in public health. **Prerequisites:** FMPH 40; PSYC 60 or MATH 11 or MATH 3C or MATH 10A or MATH 10B; and upper-division standing.

**FMPH 110 Health Behavior and Chronic Diseases (4):** This course introduces health behavior concepts through applications to chronic disease prevention. The focus is on smoking, dietary behaviors, and physical activity and is organized around relationships to health, measurement, influencing factors, interventions, and translation to public health practice. **Prerequisites:** FMPH 40 and upper-division standing.

**FMPH 120 Health Policies for Healthy Lifestyles (4):** This course covers the rationale for and effectiveness of policies to influence nutrition, physical activity, and substance use behavior. Policies include legalization, taxation, labeling, produce manufacturing, warning labels, licensing, marketing, and counter-marketing practices and restrictions on use. **Prerequisites:** FMPH 40 and upper-division standing.

**FMPH 130 Environmental and Occupational Health (4):** This core public health course addresses the fundamentals of environmental and occupational health, including identification of hazards, basic toxicology, risk assessment, prevention/protection, and regulatory/control policies. Specific environmental and occupational hazards and relevant case studies will be presented. **Prerequisites:** FMPH 50, FMPH 101 and upper-division standing.

**USP 143 The U.S. Health Care System (4):** This course will provide an overview of the organization of health care within the context of the community with emphasis on the political, social, and cultural influences. It is concerned with the structure, objectives, and trends of major health and health-related programs in the United States to include sponsorship, financing, training and utilization of health personnel. **Prerequisites:** Upper-division standing.

### 2. Required Public Health Capstone courses (can be replaced with BSPH Practica) (8 units required)

**FMPH 193 Public Health Capstone I (4):** This is the first of a two-part capstone series that serves as the culminating experience for the B.S. in Public Health (BSPH) majors. Students will integrate the skills and knowledge gained throughout the BSPH program and learn critical elements of public health research and practice. **Prerequisites:** FMPH 40, FMPH 50, FMPH 101, FMPH 102 and FMPH 110. Department approval required.

**FMPH 194 Public Health Capstone II (4):** This is the second of a two-part capstone series that serves as the culminating experience for B.S. in Public Health (BSPH) majors. Students will interpret and contextualize findings from their projects completed in the first part of the series. Oral and written presentations will focus on disseminating public health information in diverse formats. **Prerequisites:** FMPH 120 and FMPH 193. Department approval required.

### B. BSPH Practica Options

**FMPH 180A Advanced Practicum I (4):** Emphasizes key public health concepts including program planning, research design, and written/oral communication skills. Seminar done in combination with research, internship, or overseas experiences, completed after FMPH 180A. Open to public health majors with upper-division standing. **Prerequisites:** FMPH 40, FMPH 50, FMPH 101, and FMPH 110. Department approval required. Restricted to upper-division public health majors only (FP25). 3.0 cumulative GPA. 3.3 GPA in FMPH 40, 50, 101A, and 110.
FMPH 180B Advanced Practicum II (4): Seminar participants will interpret and contextualize findings from research, internship, or overseas experiences planned in 180A and completed prior or concurrently with 180B. Oral and written presentations will focus on challenges of research and program implementation, evaluation, and sustainability. **Prerequisites:** FMPH 180A, FMPH 102, and FMPH 120. Department approval required. Restricted to public health majors only (FP25). 3.0 cumulative GPA. 3.3 GPA in FMPH 40, 50, 101A, 101B, 110, and 120.

FMPH 180C Advanced Practicum III (4): Practicum participants will interpret and contextualize findings from experiential learning program planned in 180A and completed during 180B. Oral and written presentations will focus on disseminating public health information in diverse formats. **Prerequisites:** FMPH 180B. Department approval required. Restricted to public health majors only (FP25). 3.0 cumulative GPA. 3.3 GPA in FMPH 40, 50, 101A, 101B, 110, and 120.

FMPH 196A Honors Practicum I (4): This is the first of a three-part honors series that serves as the culminating experience for B.S. in Public Health (BSPH) majors. Students review, reinforce and complement skills and knowledge gained throughout the BSPH program, and prepare a proposal integrating critical elements of public health research and practice. **Prerequisites:** FMPH 40, FMPH 50, FMPH 101, FMPH 102 and FMPH 110, and instructor approval.

FMPH 196B Honors Practicum II (4): This is the second of a three-part honors series that serves as the culminating experience for B.S. in Public Health majors. This course represents an experiential learning opportunity at a pre-approved community site. Under supervision of public health faculty and pertinent site representatives, students will refine and implement the public health proposal developed in the first part of the honors series. **Prerequisites:** FMPH 196A and instructor approval.

FMPH 196C Honors Practicum III (4): This is the third of a three-part honors series that serves as the culminating experience for B.S. in Public Health majors. Students will analyze, interpret, and contextualize findings from their projects completed in the series. Oral and written communication will focus on disseminating public health information in diverse formats, and will include a presentation and an honors thesis. **Prerequisites:** FMPH 196C and instructor approval.

C. **BSPH Experiential/Research Options**

FMPH 191 Topics in Public Health (4): Selected topics in the field of Public Health. **Prerequisites:** FMPH 40 and upper-division standing. Additional prerequisites may be required at instructor’s discretion.

FMPH 195 Instruction in Public Health (4): Introduction to teaching in a public health course. As an Undergraduate Instructional Apprentice, students will attend the lectures of the course, weekly meetings with students of the course; weekly meetings with course instructor. Responsibilities may include class presentations, designing and leading weekly discussion sections, assisting with homework and exam grading, and monitoring and responding to online discussion posts. **Prerequisites:** A minimum of A- in the course in which the student plans to assist, a 3.0 cumulative UC GPA, instructor and department approval.

FMPH 198. Directed Group Study (1–4): Investigation of Public Health topics through directed reading and discussion by a small group of students under supervision of a faculty member. P/NP grades only. FMPH 198 may be taken for credit a combined total of four times. **Prerequisites:** FMPH 40, upper-division standing, completion of ninety units of UC San Diego undergraduate study, a minimum UC San Diego GPA of 2.5, consent of instructor, and a completed and approved Special Studies form.
FMPH 199 Independent Study (2-4): Individual undergraduate study or research not covered by the present course offerings. Study or research must be under the direction of a faculty member in the Department of Family Medicine and Public Health and approval must be secured from the faculty member prior to registering. P/NP grades only. May be taken for credit six times. Prerequisites: upper-division standing, completion of ninety units of UCSD undergraduate study, a minimum UCSD GPA of 2.5, consent of instructor, and a completed and approved Special Studies form.

AIP 197 Academic Internship Program (4): AIP 197 is an upper-division, special studies course. AIP offers students of all majors the opportunity to intern and conduct research in diverse professional and community settings while earning 2, 4, 8 or 12 units of P/NP academic credit over the course of the quarter. Through the academic internship experience students enhance their research, critical thinking, problem-solving, and writing skills by bringing an academic lens to a question or issue related to the internship experience. Research paper and internship hour requirements correspond with the number of units elected.

D. BSPH Elective Course Options (20 units required)

ANBI 130. Biology of Inequality (4): Biological and health consequences of racial and social inequalities. Psychosocial stress and measurement of health impact. Effects on disease and precursors to disease, including measures of molecular biology (e.g., epigenetics, gene expression), and biomarkers of inflammation, cardiometabolic health, and immune function. Prerequisites: upper-division standing.

ANSC 143. Mental Health as Global Health Priority (4): Why is mental health a global concern? This anthropological course reviews globalization, culture, and mental health. We examine issues of social suffering, stigma, and economic burden associated with mental illness, gender inequality, political violence, "global security," pharmaceutical and illegal drugs. Prerequisites: upper-division standing.

ANSC 144. Immigrant and Refugee Health (4): Examines physical and mental health sequelae of internal and transnational movement of individuals and populations due to warfare, political violence, natural disaster, religious persecution, poverty and struggle for economic survival, and social suffering of communities abandoned by migrants and refugees. Prerequisites: upper-division standing.

ANSC 146. A Global Health Perspective on HIV (4): An introductory course on HIV taught through a medical student format, with emphasis on research and experiential learning, including observation of physicians providing care for patients from diverse socioeconomic and cultural backgrounds, some of whom may be underinsured/uninsured, homeless, and/or immigrants. Prerequisites: upper-division standing.

ANSC 147. Global Health and the Environment (4): Examines interactions of culture, health, and environment. Rural and urban human ecologies, their energy foundations, sociocultural systems, and characteristic health and environmental problems are explored. The role of culture and human values in designing solutions will be investigated. Prerequisites: upper-division standing.

ANSC 148. Global Health and Cultural Diversity (4): Introduction to global health from the perspective of medical anthropology on disease and illness, cultural conceptions of health, doctor-patient interaction, illness experience, medical science and technology, mental health, infectious
disease, and health-care inequalities by ethnicity, gender, and socioeconomic status. **Prerequisites:** upper-division standing.

**ANSC 150. Culture and Mental Health (4):** This course reviews mental health cross-culturally and transnationally. Issues examined are cultural shaping of the interpretation, experience, symptoms, treatment, course, and recovery of mental illness. World Health Organization findings of better outcome in non-European and North American countries are explored. **Prerequisites:** upper-division standing.

**ANSC 164. Introduction to Medical Anthropology (4):** Basic concepts and theory of medical anthropology are introduced and applied to comparison of medical systems including indigenous and biomedical, taking into account cross-cultural variation in causal explanation, diagnosis, perception, management, and treatment of illness and disease. **Prerequisites:** upper-division standing.

**BIBC 120. Nutrition (4):** Elaborates the relationship between diet and human metabolism, physiology, health, and disease. Covers the functions of carbohydrates, lipids, proteins, vitamins, and minerals, and discusses dietary influences on cardiovascular disease, diabetes, obesity, and cancer. **Prerequisites:** BIBC 102.

**BICD 136. AIDS Science and Society (4):** An introduction to all aspects of the AIDS epidemic. Topics will include the epidemiology, biology, and clinical aspects of HIV infection, HIV testing, education and approaches to therapy, and the social, political, and legal impacts of AIDS on the individual and society. In order to count for their major, biology majors must take the upper-division course, BICD 136. **Prerequisites:** BILD 1, BILD 2 recommended.

**BIEB 100. Biostatistics (4):** An interactive introduction to estimation, hypothesis testing, and statistical reasoning. Emphasis on the conceptual and logical basis of statistical ideas. Focus on randomization rather than parametric techniques. Topics include describing data, sampling, bootstrapping, and significance. Mandatory one-hour weekly section. Students may not receive credit for both BIEB 100 and SIO 187. **Prerequisites:** BILD 3 and Math 10A or 20A and Math 10B or 20B. Students may not receive credit for both BIEB 100 and SIO 187.

**BIEB 152. Evolution of Infectious Diseases (4):** Treating infectious diseases is a uniquely difficult problem since pathogens often evolve, rendering today's therapies useless tomorrow. This course will provide a review of concepts and methods in evolutionary medicine, with an emphasis on microbial genomics and molecular evolution. **Prerequisites:** BILD 3.

**BIMM 110. Molecular Basis of Human Disease (4):** An examination of the molecular basis of human diseases. Course emphasizes inherited human disorders, and some important diseases caused by viruses. Focus on the application of genetic, biochemical, and molecular biological principles to an understanding of the diseases. Course restricted to upper-division biology majors. **Prerequisites:** BICD 100; BIBC 102; BIMM 100.

**BIMM 124. Medical Microbiology (4):** Encompasses the increasingly important areas of viral, bacterial, and parasitic diseases and understanding the complex interaction between humans and infectious agents. Covers human-pathogen interactions, mechanisms and molecular principles of infectious diseases, immune responses, countermeasures by pathogens and hosts, epidemiology, and cutting-edge approaches to therapy. **Prerequisites:** BIBC 100 or BIBC 102.

**BIMM 134. Biology of Cancer (4):** This course covers basic processes of transformation and tumor formation in a two-part format. The first section is focused on molecular and cellular mechanisms of
carcinogenesis. The second section discusses tumor pathology and metastasis. Open to upper-division students only. **Prerequisites**: BICD 110 and BIMM 100.

**BIPN 108. Physiology of Exercise (4)**: Course addresses the human body’s response to exercise, addressing energy metabolism and the effects of both acute and chronic exercise on function in several important organ systems. Designing training regimes and the role of exercise in health will be considered. **Prerequisites**: BIPN 100 required; BIPN 102 and BIBC 102 recommended.

**COGS 174. Drugs: Brain, Mind, and Culture (4)**: This course explores how drugs interact with the brain/mind and culture. It covers evolutionary and historical perspectives, brain chemistry, pharmacology, expectancies and placebo effects, and models of addiction. It also provides a biopsychosocial survey of commonly used and abused substances. **Prerequisites**: upper-division standing.

**COMM 102C. MMPP: Practicum in New Media and Community Life (6)**: A combined lecture/lab in a specially designed after-school setting in southeastern San Diego working with children and adults. Students design new media and produce special projects, and explore issues related to human development, social justice, and community life. May be taken for credit three times. Students will not receive credit for COMT 115 and COMM 102C. **Prerequisites**: none.

**COMM 114J. CSI: Food Justice (4)**: Examine food justice from multiple analytical and theoretical perspectives: race, class, diversity, equity, legal-institutional, business, ethical, ecological, scientific, cultural, and socio-technical. Compare political strategies of food justice organizations/movements aimed at creating healthy and sustainable food systems locally and globally. **Prerequisites**: COMM 10.

**ECON 125. Demographic Analysis and Forecasting (4)**: Interaction between economic forces and demographic changes are considered, as are demographic composition and analysis; fertility, mortality, and migration processes and trends. Course emphasizes the creation, evaluation, and interpretation of forecasts for states, regions, and subcounty areas. Econ 178 is recommended. **Prerequisites**: Econ 120B or Math 181B.

**ECON 130. Public Policy (4)**: Course uses basic microeconomic tools to discuss a wide variety of public issues, including the war on drugs, global warming, natural resources, health care and safety regulation. Appropriate for majors who have not completed Econ 100A-B-C and students from other departments. **Prerequisites**: Econ 2 or 100A.

**ECON 131. Economics of the Environment (4)**: Environmental issues from an economic perspective. Relation of the environment to economic growth. Management of natural resources, such as forest and fresh water. Policies on air, water, and toxic waste pollution. International issues such as ozone depletion and sustainable development. **Prerequisites**: Econ 2 or 100A.

**ECON 140. Economics of Health Producers (4)**: Provides an overview of the physician, hospital, and pharmaceutical segments of the health sector. Uses models of physician behavior, for-profit and nonprofit institutions to understand the trade-offs facing health-sector regulators and the administrators of public and private insurance arrangements. **Prerequisites**: Econ 2 or 100B.

**ECON 141. Economics of Health Consumers (4)**: Demand for health care and health insurance, employer-provision of health insurance and impact on wages and job changes. Cross-country comparisons of health systems. **Prerequisites**: Econ 100C.
ETHN 103. Environmental Racism (4): This course will examine the concept of environmental racism, the empirical evidence of its widespread existence, and the efforts by government, residents, workers, and activists to combat it. We will examine those forces that create environmental injustices in order to understand its causes as well as its consequences. Students are expected to learn and apply several concepts and social scientific theories to the course material.

ETHN 142. Medicine, Race, and the Global Politics of Inequality (4): Globalization fosters both the transmission of AIDS, cholera, tuberculosis, and other infectious diseases and gross inequalities in the resources available to prevent and cure them. This course focuses on how race, ethnicity, gender, sexuality, class, and nation both shape and are shaped by the social construction of health and disease worldwide.

ETHN 157. Madness and Urbanization (4): (Cross-listed with USP 149.) This course will provide a historical and theoretical orientation for contemporary studies of the experience of mental illness and mental health-care policy in the American city, with critical attention to racial and ethnic disparities in diagnosis, treatment, and outcomes.

ETHN 190. Research Methods: Studying Racial and Ethnic Communities (4): (Cross-listed with USP 129.) The course offers students the basic research methods with which to study ethnic and racial communities. The various topics to be explored include human and physical geography, transportation, employment, economic structure, cultural values, housing, health, education, and intergroup relations.


HISC 116. History of Bioethics (4): The story behind the postwar rise of bioethics—medical scandals breaking in the mass media, the development of novel technologies for saving and prolonging life, the emergence of new diseases, the unprecedented scope for manipulation opened up by biology.

HISC 180. Science and Public Policy (4): This course will explore the evolution of the institutions, ideologies, procedures, standards, and expertise that modern democratic societies have used in applying science to generate and legitimate public policy.

LTCS 165. Special Topics: The Politics of Food: This course will examine the representation and politics of food in literary and other cultural texts. Topics may include: food and poverty, the fast food industry, controversies about seed, sustainable food production, myths about hunger, eating and epistemology, aesthetics, etc. Repeatable for credit up to three times when topics vary.

MATH 111A. Mathematical Modeling I (4): An introduction to mathematical modeling in the physical and social sciences. Topics vary, but have included mathematical models for epidemics, chemical reactions, political organizations, magnets, economic mobility, and geographical distributions of species. May be taken for credit two times when topics change. Prerequisites: Math 20D and either Math 20F or Math 31AH, and Math 109, or consent of instructor.

MATH 111B. Mathematical Modeling II (4): Continued study on mathematical modeling in the physical and social sciences, using advanced techniques that will expand upon the topics selected and
further the mathematical theory presented in Math 111A. **Prerequisites:** Math 111A or consent of instructor.

**MATH 181A. Introduction to Mathematical Statistics I (4):** Multivariate distribution, functions of random variables, distributions related to normal. Parameter estimation, method of moments, maximum likelihood. Estimator accuracy and confidence intervals. Students completing Econ 120A instead of Math 180A must obtain consent of instructor to enroll. Prior or concurrent enrollment in Math 109 is highly recommended. **Prerequisites:** Math 180A, and Math 20F or Math 31AH, or consent of instructor.

**MATH 181B. Introduction to Mathematical Statistics II (4):** Hypothesis testing. Linear models, regression, and analysis of variance. Goodness of fit tests. Nonparametric statistics. Two units of credit offered for Math 181B if Econ 120B previously; no credit offered if Econ 120B concurrently. Prior enrollment in Math 109 is highly recommended. **Prerequisites:** Math 181A or consent of instructor.

**MATH 181C. Mathematical Statistics—Nonparametric Statistics (4):** Topics covered may include the following: classical rank test, rank correlations, permutation tests, distribution free testing, efficiency, confidence intervals, nonparametric regression and density estimation, resampling techniques (bootstrap, jackknife, etc.) and cross validations. Prior enrollment in Math 109 is highly recommended. **Prerequisites:** Math 181B or consent of instructor.

**MATH 181E. Mathematical Statistics—Time Series (4):** Analysis of trends and seasonal effects, autoregressive and moving averages models, forecasting, and informal introduction to spectral analysis. **Prerequisites:** Math 181B or consent of instructor.

**MATH 183. Statistical Methods (4):** Introduction to probability. Discrete and continuous random variables—binomial, Poisson and Gaussian distributions. Central limit theorem. Data analysis and inferential statistics: graphical techniques, confidence intervals, hypothesis tests, curve fitting. (Credit not offered for Math 183 if Econ 120A, ECE 109, Math 180A, Math 181A, or Math 186 previously or concurrently taken.) **Prerequisites:** Math 20C (21C) with a grade of C– or better, or consent of instructor.

**MATH 185. Introduction to Computational Statistics (4):** Statistical analysis of data by means of package programs. Regression, analysis of variance, discriminant analysis, principal components, Monte Carlo simulation, and graphical methods. Emphasis will be on understanding the connections between statistical theory, numerical results, and analysis of real data. Recommended preparation: exposure to computer programming (such as CSE 5A, CSE 7, or ECE 15) highly recommended. **Prerequisites:** Math 11, or Math 181A, or Math 183, or Math 186, or MAE 108, or ECE 109, or Econ 120A, and either Math 20F or Math 31AH or consent of instructor.

**MATH 186. Probability Statistics for Bioinformatics (4):** This course will cover discrete and random variables, data analysis and inferential statistics, likelihood estimators and scoring matrices with applications to biological problems. Introduction to Binomial, Poisson, and Gaussian distributions, central limit theorem, applications to sequence and functional analysis of genomes and genetic epidemiology. (Credit not offered for Math 186 if Econ 120A, ECE 109, Math 180A, Math 181A, or Math 183 previously or concurrently.) **Prerequisites:** Math 20C (21C) with a grade of C– or better, or consent of instructor.

**MATH 189. Exploratory Data Analysis and Inference (4):** An introduction to various quantitative methods and statistical techniques for analyzing data—in particular big data. Quick review of
probability continuing to topics of how to process, analyze, and visualize data using statistical language R. Further topics include basic inference, sampling, hypothesis testing, bootstrap methods, and regression and diagnostics. Offers conceptual explanation of techniques, along with opportunities to examine, implement, and practice them in real and simulated data. **Prerequisites:** Math 20F or Math 31AH, and Math 180A. Students who have not completed listed prerequisites may enroll with consent of instructor.

**MGT 173. Project Management: Health Services (4):** This course covers efficient techniques for managing health services projects, including both the technical aspects of project management as well as the human-capital management issues associated with blending administrative and technical staff with health-care professionals. Topics include scheduling methods, milestone setting, governmental regulations, resource allocation, interpersonal skills, and performing research and development projects—all with a health services focus. **Prerequisites:** upper-division standing.

**PHIL 163. Biomedical Ethics (4):** Moral issues in medicine and the biological sciences, such as patient’s rights and physician’s responsibilities, abortion and euthanasia, the distribution of health care, experimentation, and genetic intervention. **Prerequisites:** upper-division standing or consent of instructor.

**POLI 125B. The Politics of Food in a Global Economy (4):** This course explores emerging issues in production and consumption of food in a global economy. On production side, we discuss issues such as famine, overproduction of commercial crops, and sustainability. On consumption side, we explore issues such as fair trade, ethical consumption, and public health consequences (such as obesity). Then we discuss the roles of governments, international organizations, and communities to address these issues.

**POLI 160AA. Introduction to Policy Analysis (4):** (Same as USP 101) This course will explore the process by which the preferences of individuals are converted into public policy. Also included will be an examination of the complexity of policy problems, methods for designing better policies, and a review of tools used by analysts and policy makers. **Prerequisites:** Poli Sci 10 or 11.


**PSYC 104. Social Psychology (4):** This course provides a comprehensive overview of the field of social psychology, covering a review of the field’s founding principles, classic findings, and a survey of recent findings. Topics will include social perception, attributions and attitudes, stereotypes, social influence, group dynamics, and aggressive and prosocial tendencies. **Prerequisites:** upper-division standing.

**PSYC 134. Eating Disorders (4):** This course provides an overview of the biology and psychology of eating disorders such as anorexia nervosa, bulimia nervosa, and binge eating disorder. Abnormal, as well as normal, eating will be discussed from various perspectives including endocrinological, neurobiological, psychological, sociological, and evolutionary. **Prerequisites:** upper-division standing.

**PSYC 155. Social Psychology and Medicine (4):** This course provides an exploration of health, illness, treatment, and delivery of treatment as they relate to psychological concepts and research and considers how the social psychological perspective might be extended into medical fields. **Prerequisites:** upper-division standing.
PSYC 173. Psychology of Food and Behavior (4): This course provides an overview of the biological, psychological, and social influences on the psychology of food and behavior. Topics may include taste preferences and aversions and how they are learned, how culture influences food selection, and food-related behaviors across the lifespan. **Prerequisites:** upper-division standing or consent of instructor.

PSYC 179. Drugs, Addiction, and Mental Disorders (4): This course provides an overview of the use, abuse, liability, and psychotherapeutic effects of drugs on humans. **Prerequisites:** upper-division standing.

PSYC 181. Drugs and Behavior (4): Develops basic principles in psychopharmacology while exploring the behavioral effects of psychoactive drugs and mechanisms of action of drugs. **Prerequisites:** psychology major or minor, or biology major or minor.

PSYC 188. Impulse Control Disorders (4): This course provides an overview of problems of impulse control, which are important features of major psychiatric disorders and also of atypical patterns of behavior including pathological gambling, compulsive sex, eating, exercise, and shopping. Topics include development, major common features, treatment, and neurobiological basis of impulse control disorders. **Prerequisites:** upper-division standing.

REV 160GS. Public Health and Epidemiology I (4): Introduction to public health concepts and methodologies, including epidemiology, nutrition, health behavior, and public health ethics.

REV 165GS. Public Health and Epidemiology II (4): Focuses on epidemiology as the backbone of public health. Covers data collection and study design. Includes field work collecting data in collaboration with local agencies and health clinics.

SIO 187. Statistical Methods in Marine Biology (4): Introduction to statistical inference. Emphasis on constructing statistics for specific problems in marine biology. Topics include probability, distributions, sampling, replication, and experimental design. Students may not receive credit for both SIO 187 and BIEB 100. **Prerequisites:** BILD 3 or consent of instructor.

SIO 189. Pollution, Environment and Health (4): The goal is to understand the scope of the pollution problem facing the planet. Students will learn the properties of chemicals in the environment and survey the biological mechanisms that determine their accumulation and toxicity. **Prerequisites:** Chem 6C and BILD 1 or 3 or consent of instructor. (S)

SOCI 102. Network Data and Methods (4): Social network analysts view society as a web of relationships rather than a mere aggregation of individuals. In this course, students will learn how to collect, analyze, and visualize social network data, as well as utilize these techniques to answer an original sociological research question. **Prerequisites:** SOCI 60, upper-division standing.

SOCI 104Q. Qualitative Interviewing (4): This course provides students with tools to conduct original research using qualitative interviews. Students will learn how to prepare, conduct, and analyze qualitative interviews. Special emphasis will be placed on the presentation of research in written form. **Prerequisites:** upper-division standing. Will not receive credit for SOCI 104Q and SOCA 104Q.

SOCI 108. Survey Research Design (4): Translation of research goals into a research design, including probability sampling, questionnaire construction, data collection (including interviewing techniques), data processing, coding, and preliminary tabulation of data. Statistical methods of
analysis will be limited primarily to percentaging. **Prerequisites:** SOCI 60. Will not receive credit for SOCI 108 and SOCA 108.

**SOCI 113. Sociology of the AIDS Epidemic (4):** This course considers the social, cultural, political, and economic aspects of HIV/AIDS. Topics include the social context of transmission; the experiences of women living with HIV; AIDS activism; representations of AIDS; and the impact of race and class differences. **Prerequisites:** upper-division standing. Will not receive credit for SOCI 113 and SOCB 113.

**SOCI 134. The Making of Modern Medicine (4):** A study of the social, intellectual, and institutional aspects of the nineteenth-century transformation of clinical medicine, examining both the changing content of medical knowledge and therapeutics, and the organization of the medical profession. **Prerequisites:** upper-division standing. Will not receive credit for SOCI 134 and SOCC 134A.

**SOCI 135. Medical Sociology (4):** An inquiry into the roles of culture and social structure in mediating the health and illness experiences of individuals and groups. Topics include the social construction of illness, the relationships between patients and health professionals, and the organization of medical work. **Prerequisites:** upper-division standing. Will not receive credit for SOCI 135 and SOCC 135.

**SOCI 136F. Sociology of Mental Illness in Contemporary Society (4):** This course will focus on recent developments in the mental illness sector and on the contemporary sociological literature on mental illness. Developments in England as well as the United States will be examined. **Prerequisites:** upper-division standing. Will not receive credit for SOCI 136F and SOCC 136B.

**SOCI 137. Sociology of Food (4):** Topics include food as a marker of social differences (e.g., gender, class, ethnicity); the changing character of food production and distribution; food as an object of political conflict; and the symbolic meanings and rituals of food preparation and consumption. **Prerequisites:** upper-division standing. Will not receive credit for SOCI 137 and SOCB 137.

**SOCI 152. Social Inequality and Public Policy (4):** (Same as USP 133.) Primary focus on understanding and analyzing poverty and public policy. Analysis of how current debates and public policy initiatives mesh with alternative social scientific explorations of poverty. **Prerequisites:** upper-division standing. Will not receive credit for SOCI 152 and SOCC 152.

**USP 101. Introduction to Policy Analysis (4):** (Same as Political Science 160AA.) This course will explore the process by which the preferences of individuals are converted into public policy. Also included will be an examination of the complexity of policy problems, methods for designing better policies, and a review of tools used by analysts and policy makers. **Prerequisites:** upper-division standing or consent of instructor.

**USP 129. Research Methods: Studying Racial and Ethnic Communities (4):** (Same as ETHN 190.) The course offers students the basic research methods with which to study ethnic and racial communities. The various topics to be explored include human and physical geography, transportation, employment, economic structure, cultural values, housing, health, education, and intergroup relations. **Prerequisites:** upper-division standing or consent of instructor.

**USP 133. Social Inequality and Public Policy (4):** (Same as SOC 152.) Primary focus on understanding and analyzing poverty and public policy. Analysis of how current debates and public
policy initiatives mesh with alternative social scientific explanations of poverty. Prerequisites: upper-division standing.

USP 136. Collaborative Community Leadership (4): Provides an overview of collaborative leadership and considers consensus organizing as both a tactical and strategic approach to effective community building and development. Examines how various communities have approached collaborative leadership, consensus organizing, and community building. Prerequisites: upper-division standing.

USP 144. Environmental and Preventive Health Issues (4): This course will analyze needs of populations, highlighting current major public health problems such as chronic and communicable diseases, environmental hazards of diseases, psychiatric problems and additional diseases, new social mores affecting health maintenance, consumer health awareness and health practices, special needs of economically and socially disadvantaged populations. The focus is on selected areas of public and environmental health, namely: epidemiology, preventive services in family health, communicable and chronic disease control, and occupational health. Prerequisites: upper-division standing or consent of instructor.

USP 145. Aging—Social and Health Policy Issues (4): This course will provide a brief introduction to the nature and problems of aging, with emphasis on socioeconomic and health status; determinants of priorities of social and health policies will be examined through analysis of the structure and organization of selected programs for the elderly. Field visits will constitute part of the course. Prerequisites: upper-division standing.

USP 146. Research Methods for Built Environment and Active Living (4): This course examines urban design’s effects on physical activity. In field experience settings, students will learn about survey, accelerometer, observation, and GIS methods. Quality control, use of protocols, relevance to all ages, and international applications will also be emphasized. Prerequisites: upper-division standing.

USP 147. Case Studies in Health-Care Programs/Poor and Underserved Population (4): The purpose of this course is to identify the special health needs of low income and underserved populations and to review their status of care, factors influencing the incidence of disease and health problems, and political and legislative measures related to access and the provision of care. Selected current programs and policies that address the health-care needs have selected underserved populations such as working poor, inner city populations, recent immigrants, and persons with severe disabling mental illnesses will be studied. Offered in alternate years. Prerequisites: upper-division standing or consent of instructor. (Offered spring quarter.)

USP 149. Madness and Urbanization (4): This course will provide a historical and theoretical orientation for contemporary studies of the experience of mental illness and mental health-care policy in the American city, with critical attention to racial and ethnic disparities in diagnosis, treatment, and outcomes. Prerequisites: upper-division standing or consent of instructor.

Master of Public Health

Program Description

Students will be required to take basic coursework in all of the 5 core public health disciplines, as well as complete a required applied practice experience (practicum). Students will declare their track specialization (initially Epidemiology or Health Behavior) as part of the application and must confirm at
the end of their first year of the program. Students will be required to take at least 64 quarter units of courses; this includes at least 36 graduate level units in core disciplines, at least 16 units in the student’s designated track, and 12 units of relevant/approved elective courses. Required coursework credit hours may be reduced for health professionals and students with prior relevant graduate. The program will require the completion of a capstone project (for which a thesis is one option). Faculty advisor/mentors will be assigned to students when they begin the program. If students opt for a thesis, they will need to select a thesis advisor, propose a thesis and select a thesis committee. During the second year, the student must complete all requirements for the capstone or thesis.

**Degree Requirements**

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<thead>
<tr>
<th>REQUIRED / CORE COURSES (36 UNITS)</th>
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<tbody>
<tr>
<td>Course Number</td>
<td>Course Title</td>
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<tr>
<td>FMPH401</td>
<td>Introduction to Biostatistics</td>
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<td>FMPH402</td>
<td>Introduction to Epidemiology</td>
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<tr>
<td>FMPH403</td>
<td>Introduction to Health Behavior</td>
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<tr>
<td>FMPH406</td>
<td>Public Health Research Methods</td>
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<tr>
<td>FMPH407</td>
<td>Environmental Health</td>
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<tr>
<td>FMPH408</td>
<td>Health Policy and Management</td>
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<td>FMPH409</td>
<td>Public Health Practicum</td>
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<td>FMPH410</td>
<td>Scientific Writing</td>
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<td>FMPH411</td>
<td>Master’s Capstone/Thesis Independent Study</td>
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<tr>
<td>FMPH412</td>
<td>Public Health Master’s Capstone/Thesis</td>
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<tr>
<th>Health Behavior Track</th>
<th>Epidemiology Track</th>
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<tr>
<td>REQUIRED COURSES PER TRACK (16 UNITS)</td>
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<tr>
<td>FMPH413</td>
<td>Health Behavior Interventions</td>
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<td>FMPH414</td>
<td>Measurement and Program Evaluation</td>
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<tr>
<td>FMPH415</td>
<td>Scale Development for Behavioral Health Measurement</td>
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<tr>
<td>FMPH416</td>
<td>Ethics in Public Health Research/Practice</td>
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**ELECTIVES (12 UNITS)**

Student selects any other appropriate courses offered within the department; may also be fulfilled by FMPH499 (Independent Study), or graduate-level courses outside the Department (with approval of Program Director).

**Current List of MPH Degree Courses**

**MPH Core Requirements**

**FMPH 401 Introduction to Biostatistics (4):** Students will understand principles of measurement of clinical data, recognize data types, and correctly identify statistical methods appropriate for analysis of a given clinical data set. They will gain experience in assembling a clinical dataset in formats suitable for analysis by STATA or other comparable statistical packages. They will learn skills to conduct graphical
and numerical exploratory data analysis, comparative tests of categorical, ordinal, and continuous data, linear and logistic regression analysis, and survival analysis by life table and Kaplan-Meier techniques.

**FMPH 402 Introduction to Epidemiology (4)**
Participants will recognize and understand different types of study designs, the relative strengths and limitations of each, and the proper choice of study design in conducting their own research. They will also be able to identify and calculate the correct measure of risk for each study design. Participants will recognize major sources of bias, confounding and misclassification, and understand design and analysis methods of dealing with each. They will also be familiar with criteria to differentiate association from causation.

**FMPH 403 Introduction to Health Behavior (4):** This course provides an opportunity for students to explore the theoretical issues and current methodologies related to understanding and influencing health behavior change in diverse populations. The course will focus on the social and behavioral determinants of health on the individual, interpersonal, community, institutional and policy levels. This also covers examples of application of theories to determinants and intervention research, and disparities in health behavior. A required component of this course will also be certification in human subject research through the Collaborative Institutional Training Initiative (CITI) and Research Aspects of HIPAA online training programs available through the UCSD Human Research Protections Program.

**FMPH 406 Public Health Research Methods (4):** This course will provide students an understanding of the principles and skills of conducting research commonly used in public health settings. The course will cover topics ranging from hypothesis generation, research conceptualization, experimental and quasi-experimental design, clinical trials, community-based participatory research, survey design and measurement. In addition, the course will cover issues of interpretation – from detecting data patterns to inferring whether a set of findings can be generalized to other people, places, and time periods.

**FMPH 407 Environmental Health (4):** This course will provide background on the history of the recognition of chemical, physical, and biological environmental hazards and associated adverse health outcomes experienced in workplace and general environment. Health outcomes considered will include respiratory disorders, cardiovascular diseases, cancer, birth defects, and psychiatric disorders. Major modalities of prevention and control will be presented and the role of health practitioners, government, management and labor will be reviewed. The course will include guest lecturers, films, videotapes, and field visits to local industries and/or clinicians treating occupational diseases.

**FMPH 408 Health Policy and Management (4):** This course intended to introduce students to health policy making and organization of the United States health care system. Students will be introduced to current issues in US health policy and the organizations that comprise the US health care system. Students will also learn to apply principles of health policy analysis including an overview of the legislative process and methods of legislative analysis.

**FMPH 409 Public Health Practicum (4):** Public Health Practicum (4 units), in which students must complete at least 150 hours at a pre-approved field experience placement. This is equivalent to approximately one month (4 weeks) of full-time (8 hours per day) work. Students can complete the field experience as a full-time or part-time experience in the summer months between the first and second year, or they can complete the field experience longitudinally throughout the second year during the Fall, Winter, and/or Spring quarters.

**FMPH 410 Scientific Writing (4):** This course will provide students with formal instruction in conceptualizing and operationalizing scientific projects and writing scientific manuscripts, grants, and reports, which will ultimately help guide capstone and thesis preparation and completion. The essential
elements of research development and thesis/manuscript writing, including outlining, preparing drafts that
conform to thesis/journal requirements, and finalizing reports/manuscripts, will be presented. Peer-
reviewed publications on a range of public health topics will be provided as examples. The final product
will be a review paper on a selected public health topic or a draft of an original research paper that can be
used, in part or full, as the introduction and background for the written capstone/thesis.

FMPH 411 Master’s Capstone/Thesis Independent Study (2): This Independent Study is provided for
students to actively engage in work on their Master’s Capstone/Thesis, and may involve project
conceptualization and operationalization, literature review, data collection, data analysis, and
interpretation/writing.

FMPH 412 Public Health Master’s Capstone/Thesis (2): The scope of the thesis will be decided by
mutual agreement among the student, thesis advisor, and thesis committee members, and a thesis
agreement form will be completed and signed. Students and their advisors will be responsible for
identification of appropriate thesis topics. Each student will be required to prepare a thesis proposal that
will be reviewed and approved by the entire thesis committee before embarking on the thesis project.
MPH thesis projects will typically involve analysis and summarization of previously collected data from
an ongoing or completed public health research project, although other options, such as newly launched
pilot studies or literature reviews, will also be possible. The thesis must be approved by the thesis
committee and submitted to the UCSD Graduate Division. The thesis must meet University standards,
and can be structured to facilitate preparation of one or more manuscripts for submission to the peer-
reviewed literature, although acceptance of publication is not a requirement. Students will also be
couraged, but not required, to defend their theses in public academic settings.

FMPH 413 Health Behavior Interventions (4): This course focuses on critical analyses of success and
failure of behavior theories as applied to interventions in multiple fields (e.g. smoking, dietary behavior,
and physical activity). The course will prepare students to design behavior change interventions covering
individual and population approaches to behavior change.

FMPH 414 Measurement and Program Evaluation (4): This course will convey a conceptual
framework for conducting different types of program evaluation, introduce methods for needs assessment,
formative research, experimental and quasi-experimental study designs, and measurement of process and
outcome variables. Mediator and moderator analyses, as well as cost and cost-effectiveness analyses will
be covered.

FMPH 415 Scale Development for Behavioral Health Measurement (4): This course will present
theory and methods for developing instruments to capture behavioral outcomes and understanding the
design of scales to assess health behavior constructs (e.g., well-being, mental health, social support).
Methods for evaluation of reliability and validity will be covered. Prerequisites: at least one graduate
level statistics or research methods class.

FMPH 416 Ethics in Public Health Research/Practice (2): Ethics in public health are complex as
questions of community, social justice, culture, autonomy and individual rights introduce unique
challenges that may be difficult for a practitioner or researcher to recognize and navigate. This course will
explore “applied” research and practical ethics using a broad range of both historic and contemporary
public health cases. Students will learn how to recognize, analyze and discuss ethical issues associated
with the field of public health.

FMPH 417 Advanced Epidemiological Methods (4): Students will select the appropriate sampling
method and determine the sample size necessary for specific projects and adjust for confounding.
Participants will become familiar with several specialized analytic techniques, including matched, cluster,
and meta-analyses. They will also be presented with methodological and ethical issues, unique to ecological, behavioral, and genetic studies.

**FMPH 418 Environmental Epidemiology (4):** This course will provide students with epidemiologic perspectives and requisite study design skills and ethical considerations to conduct investigations of environmental determinants of relatively common adverse health outcomes, including cancer, cardiovascular disease, neurological disorders, and respiratory diseases. Students will critically review selected literature, and develop research proposals for epidemiologic research that may lead to master’s thesis or doctoral dissertation projects.

**FMPH 419 Cardiovascular Disease Epidemiology (4):** This course will provide students with background on the population frequencies and etiologic risk factors for ischemic heart disease, hypertension, and stroke. Emphasis will be placed on identifying suitable epidemiologic approaches for characterizing preventable risk factors, as well as ethical considerations in CVD Epidemiology research.

**FMPH 420 Emerging and Re-emerging Infectious Diseases (4):** Designed to increase students understanding and skills required to diagnose, study, prevent and control emerging and re-emerging infectious diseases. This course will focus on contributing factors in emergence, surveillance, epidemiology, prevention, methodology and ethical considerations for studying these diseases.

**Current MPH Degree Electives**

**FMPH 421 Advanced Health Behavior Interventions (4):** This course would provide an in-depth examination of intervention conceptualization, development, and implementation of both population and individual approaches to health behavior intervention. Students will gain knowledge of current approaches to designing, implementing, and evaluating individual and population level health behavior interventions to prevent the health consequences associated with obesity, physical activity, and tobacco use.

**FMPH 422 Clinical Nutrition (2):** Clinical nutrition is the study of nutrition and diet as related to the prevention and treatment of human disease. Nutrition is an interdisciplinary field of study, built on a foundation of biomedical and behavioral sciences. This course emphasizes class discussion of clinical topics and assigned readings in current areas of research and practice (i.e., diet and cancer, vitamin and other diet supplements), with case studies and illustrative class exercises.

**FMPH 423 Community Advocacy (4):** Students will participate in didactic sessions learning principles for developing and maintaining community-academic research partnerships. Students may also participate in supervised research, evaluation, health education, and related activities in area community health centers and similar UCSD clinical and outreach programs.

**FMPH 424 Cultural Perceptions of Health and Disease (4):** To improve knowledge about health and illness within cultural contexts, including review and discussions of epidemiologic studies describing health indicators/beliefs/practices. Students interact with experts in cross-cultural health research to explore ethnicity/culture in health care delivery & utilization, and disease risk. **Prerequisites:** Open to medical or graduate students. Other students admitted with consent of instructor.

**FMPH 425 Problems in Global Health (4):** This is a highly practical course focusing on implementation of successful methodologies to solve global health issues. Illustrates and explores ecologic settings and frameworks for study and understanding of global health and international health policy. Students acquire understanding of diverse determinants and trends of disease in various settings.
and inter-relationships between socio-cultural-economic development and health. Examination of the elements of successful interventions will be discussed using case studies drawn from real-life situations.

**FMPH 426 Health Services Research (4)**: Participants will evaluate relevant outcomes in patient-oriented research from the patient (quality of life) and societal (economic) perspectives and locate potential resources for assessing the relevant outcomes in a wide variety of study designs. They will also be able to describe the relative strengths of different health services research approaches to a clinical problem. Finally, they will understand the components of clinical practice guidelines, including patient preferences, and how these guidelines both depend upon as well as inform patient-oriented research.

**FMPH 427 Health Policy and Health Behaviors in the United States (3)**: This course summarizes characteristics of the US healthcare system and how it motivates health behaviors that negatively or positively affect outcomes. Also addressed are contemporary health policy issues related to health behaviors (e.g. smoking, dietary behavior and physical activity).

**FMPH 428 Cancer: Cause and Prevention (4)**: This course will provide an overview of the problem of cancer and its avoidable causes. It covers some of the most significant topics currently facing cancer prevention professional as they try to prevent cancer from occurring in the first place and delay its progression.

**FMPH 429 Perinatal Epidemiology (4)**: This seminar format course will address the causes (e.g., environmental toxicants, substance abuse, and genetics), diagnosis, and treatment of various perinatal diseases. The student will gain an in depth knowledge of obstetric-pediatric diseases through a medical, legal, and epidemiologic perspective.

**FMPH 430 Occupational Epidemiology (4)**: This course will provide an overview of the epidemiology of diseases associated with industrial and other occupational exposures in the general population. The student will gain an understanding of work environments, exposures to environmental agents, health effects, biological mechanisms associating work environments and adverse health effects, identification intervention and control strategies.

**FMPH 431 Exposure Assessment and Biomarkers in Epidemiology (4)**: This course addresses how exposure assessment accuracies or biases can influence study outcomes and conclusions in epidemiology. Special emphasis will be on biomarkers as recent measures of exposure.

**FMPH 432 Environmental Toxicology and Risk Assessment (4)**: This course will cover basic principles of toxicology, including uptake and distribution of toxicants, organ-specific toxicity, dose-response, and genetic susceptibility. In addition, students will learn the fundamentals of risk assessment methods applied to set environmental and occupational exposure standards.

**FMPH 433 Public Health Advanced Practicum (4)**: In addition to the required Public Health Practicum, students may choose to enroll in Public Health Advanced Practicum as an elective. This elective course will be designed for students to gain additional practical experience in the conduct and evaluation of public health research, interventions, and disease surveillance programs. Practicum venues will fall within CEPH guidelines and may be regional clinical settings, public health agencies, and national agencies, such as the Center for Disease Control and Prevention. An illustrative example is the Clinical and Public Health Elective in Baja California, Mexico, which involves integrated clinical and public health experience with U.S. and Mexican graduate student and faculty teams over 3-4 days in Baja California, Mexico, with an emphasis on common clinical and public health problems in underserved populations.
FMPH 434 Biostatistics II (4): Students will understand and conduct advanced bio-statistical analyses including: multiple linear and logistic regression, survival analysis, and Cox and extended Cox regression. The scholar will also be familiar with person-time rate analysis with Poisson regression and longitudinal data analysis in the presence of missing values and varying measurement times.

FMPH 435 Clinical Trials: Issues and Dilemmas (4): This course provides a methodological perspective on clinical trials. Topics will include ethics, design of Phase I – IV trials, randomization/blinding, bias and sample-size power. Lectures will also cover “application” with eminent UCSD trialists describing conduct, design and statistical issues of specific studies. Prerequisites: Medical or Graduate Student Standing.

FMPH 436 Analysis of Longitudinal Data (4): Presents modern approaches to the analysis of repeated measures, correlated outcomes, and longitudinal data. Topics include models for longitudinal data, parametric modeling of covariance, generalized estimating equations (GEE), linear, nonlinear and generalized linear mixed effects models (GLMMs), binary, categorical and count data, and modeling dropout in longitudinal studies. Data analysis using R and computational issues are emphasized.

MPH Capstone

The MPH capstone report provides an opportunity for students to demonstrate their understanding of public health principles and methodology applied to a specific topic. The student may define a research or public health practice problem and, using existing data or field experiences, carry out the necessary data synthesis and/or analysis to answer or illuminate the problem. The student may also define a research problem and design and carry out the necessary analysis to answer or illuminate the problem posed. This may be a laboratory or epidemiologic study, medical or vital records review, qualitative data collection such as focus groups or key informant interviews. The report based on any of these project options should follow the usual research paper format. The capstone may also be based upon an in-depth analysis of existing literature leading to the development of a research proposal. The proposal should include objectives, rationale, well-defined methods, and a discussion of proposed analyses; moreover, the proposal should represent a feasible project, particularly with respect to human subjects review.

Master of Science in Biostatistics (Proposed)

Program Description

MS program requires the completion of at least 56 units of coursework. Graduate students must register for a minimum of 12 units per quarter. These 12 units can be made up of a combination of required coursework as described below, additional elective coursework if any, and special study courses (FMPH 299). In special cases, students with appropriate background may waive specific courses, with permission of the program director, as long as the 56 unit minimum for the program is met. A typical student is expected to take 60-72 units of coursework during the program. All student courses, as well as any changes throughout the quarter, must be approved by a faculty advisor prior to registering for classes each quarter.

Degree Requirements

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<tr>
<th>REQUIRED COURSES (32 UNITS)</th>
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<tbody>
<tr>
<td>Course Title</td>
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<tr>
<td>Biostatistics</td>
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Two Among the Following

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<th>Requirement</th>
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<th>Description</th>
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<tr>
<td>FMPH 224, FMPH 225, FMPH 226, FMPH 227, MATH 284</td>
<td>8</td>
<td>Upper division or the graduate level in Biomedical Sciences, Neurosciences, Epidemiology, Public Health, Biology, Systems Biology, Bioengineering, or Medicine</td>
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**ELECTIVE (16 UNITS)**

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<th>Requirement</th>
<th>Units</th>
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<tr>
<td>Life Sciences</td>
<td>8</td>
<td>Upper division or the graduate level in Biomedical Sciences, Neurosciences, Epidemiology, Public Health, Biology, Systems Biology, Bioengineering, or Medicine</td>
</tr>
<tr>
<td>Computer Science</td>
<td></td>
<td>CSE 202, CSE 250B, CSE 255, CSE 260, CSE 283, ECE 273</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>In addition to the listed elective courses, students may take other elective courses. These include FMPH 299 (special studies course), and any course at the upper division (e.g., remedial courses), or graduate level in Biostatistics, Mathematics, Computer Science, Life Sciences as listed above, or related areas. It is expected that courses in the MPH, when the program becomes active, will be popular electives.</td>
</tr>
</tbody>
</table>

**Current List of Biostatistics MS Degree Courses**

**Biostatistics MS Core Requirements**

**FMPH 221 Biostatistical Methods I (4):** Introductory graduate course on the analysis of biomedical data using the R statistical software. Topics include t-tests, ANOVAs, linear regression, model diagnostics, model building and selection, interaction, confounding, multiple comparisons, and robust tests based on ranks and resampling. **Prerequisites:** Biostatistics major or program/instructor approval

**FMPH 222 Biostatistical Methods II (4):** Intermediate-level graduate course in the analysis of categorical data. Topics include generalized linear models (logistic, Poisson, loglinear models); splines and nonlinear regression; stratified and case-control studies. Maximum likelihood, quasi likelihood and Bayesian approaches; large scale model selection and inference. **Prerequisites:** Successful completion of FMPH 221 and (Math 281A or Math 282A) or program/instructor approval.

**FMPH 223 Analysis of Longitudinal Data (4):** Covers analysis of longitudinal data, parametric modeling of covariance, generalized estimating equations, linear, nonlinear and generalized linear mixed effects models and modeling dropout in longitudinal studies. Data analysis and computational issues are emphasized. **Prerequisites:** Successful completion of FMPH 222 and (Math 281A and Math 282A or Math 281B and Math 282B) or program/instructor approval.

**FMPH 224 Clinical Trials (4):** Graduate class will cover statistical aspects of clinical trial design, monitoring, analysis and ethics of human subject research. Data analysis and computation will be emphasized. **Prerequisites:** Successful completion of FMPH 221 and FMPH 222 or program/instructor approval.

**FMPH 225 Advanced Topics in Biostatistical Inference (4):** Graduate class will cover modern statistical inference including non-parametric statistics, estimating equations, resampling methods, and statistical learning. Data analysis and computation will be emphasized. **Prerequisites:** Successful completion of FMPH 221, FMPH 222, and FMPH 223 or program/instructor approval.

**FMPH 226 Statistical Methods for Observational Studies (4):** Graduate class is an introduction to inference and causal modeling for observational data, including propensity score adjustment, inverse probability weighting, instrumental variables, and sensitivity analysis. Data analysis and computation will
be required. **Prerequisites**: Successful completion of FMPH 221, FMPH 222, and FMPH 223 or program/instructor approval.

**FMPH 227 Applied Multivariate Statistical Analysis (4)**: Graduate course covers concepts, methods and applications of multivariate data analysis, including multivariate regression, principal components, clustering and functional data analysis. Data analysis will be emphasized. **Prerequisites**: Successful completion of FMPH 221 and FMPH 222 or program/instructor approval.

**FMPH 243A Practicum in Biostatistics (4)**: Course specifically designed for this MS program that takes advantage of the extensive involvement of the program faculty in collaborative and interdisciplinary work within the Life Sciences. Didactic instruction on best practices in statistical collaboration. Under supervision, the students will participate in applied, real-life projects stemming from the research and collaborations of the faculty in the Division of Biostatistics. The students will work in small groups (2-3 students), with all students presenting their progress throughout the course, with a final presentation and project report submitted at the end of the class. **Prerequisites**: FMPH 221, FMPH 222, or instructor’s approval. (TBN)

**FMPH 244 Foundations of Biostatistics A-B (4)**: Overview of mathematical foundations of Biostatistics. Hypothesis testing and confidence intervals, one-sample and two-sample problems. Linear models, regression and ANOVA. Maximum likelihood theory. Sufficiency, efficiency, large sample theory. Robustness and power. Intended to ensure preparedness for the theory component of the Master’s Examination. **Prerequisites**: Enrollment with good standing in the Biostatistics Master’s program; advanced calculus and basic probability, theory; or consent of instructor. Credit will not be given for both FMPH 244 AB and MATH 281 AB (TBN).

**FMPH 241 Biostatistics Rotation (3)**: This practicum provides hand-on experience with biomedical research and data analysis. Working within a specific biomedical domain (e.g., cancer, genomics, or physical activity research), students will conduct original data analysis, and prepare or substantially contribute to final project report. **Prerequisites**: Biostatistics major only.

**FMPH 290 Biostatistics Journal Club and Seminar (1)**: This course requires attendance and participation in Division of Biostatistics seminar series and journal club. Students will critically read the assigned articles and participate in biweekly journal clubs. Students are also required to lead at least one journal club discussion. **Prerequisites**: Biostatistics major only.

**MATH 284 Survival Analysis (4)**: Survival analysis is an important tool in many areas of applications including biomedicine, economics, and engineering. It deals with the analysis of time to events data with censoring. This course discusses the concepts and theories associated with survival data and censoring, comparing survival distributions, proportional hazards regression, nonparametric tests, competing risk models, and frailty models. The emphasis is on semiparametric inference, and material is drawn from recent literature. **Prerequisites**: Math. 282A or consent of instructor.

**Biostatistics MS Electives**

**FMPH 242 Advanced Topics in Biostatistics (4)**: Biostatistics elective courses will be taught under this course heading. Courses will have a varying focus each year/quarter. Topics will include Random field theory and image analysis, advanced statistical computing, Bayesian methods and others. **Prerequisites**: Successful completion of FMPH 221 and FMPH 222 or program/instructor approval.

**FMPH 243B-C Practicum in Biostatistics (4)**: Continuation of FMPH 243A. Less emphasis on didactic instruction. Under the supervision of the instructing faculty, the students will participate in applied, real-
life projects stemming from the research and collaborations of the faculty in the Division of Biostatistics. The students will work in small groups (2-3 students) on a capstone project, with all students presenting their progress throughout the course, with a final presentation and project report submitted at the end of the class. Prerequisites: Enrollment with good standing in the Biostatistics Master’s program and FMPH 221, FMPH 222, or instructor’s approval.

MATH 202A Applied Algebra I (4): Introduction to algebra from a computational perspective. Groups, rings, linear algebra, rational and Jordan forms, unitary and Hermitian matrices, matrix decompositions, perturbation of eigenvalues, group representations, symmetric functions, fast Fourier transform, commutative algebra, Grobner basis, and finite fields. Prerequisites: graduate standing or consent of instructor.

MATH 240ABC Real Analysis (4): Lebesgue integral and Lebesgue measure, Fubini theorems, functions of bounded variations, Stieltjes integral, derivatives and indefinite integrals, the spaces L and C, equi-continuous families, continuous linear functionals general measures and integrations. Prerequisites: Math 140A-B-C.

MATH 271ABC Numerical Optimization (4): Formulation and analysis of algorithms for constrained optimization. Optimality conditions; linear and quadratic programming; interior methods; penalty and barrier function methods; sequential quadratic programming methods. Prerequisites: consent of instructor.

MATH 280A-B-C Probability Theory (4-4-4): Probability measures; Borel fields; conditional probabilities, sums of independent random variables; limit theorems; zero-one laws; stochastic processes. Prerequisites: advanced calculus and consent of instructor.

MATH 281A Mathematical Statistics (4): Statistical models, sufficiency, efficiency, optimal estimation, least squares and maximum likelihood, large sample theory. Prerequisites: advanced calculus and basic probability theory or consent of instructor.

MATH 281B Mathematical Statistics (4): Hypothesis testing and confidence intervals, one- sample and two-sample problems. Bayes theory, statistical decision theory, linear models and regression. Prerequisites: advanced calculus and basic probability theory or consent of instructor.

MATH 281C Mathematical Statistics (4): Nonparametrics: density estimation, regression, bootstrap and jackknife, testing. Introduction to statistical computing using S plus. Prerequisites: advanced calculus and basic probability theory or consent of instructor.

MATH 282A-B-C Applied Statistics (4-4-4): Sequence in applied statistics. First quarter: general theory of linear models with applications to regression analysis. Second quarter: analysis of variance and covariance and experimental design. Third quarter: further topics to be selected by instructor. Emphasis throughout is on the analysis of actual data. Prerequisite: Math. 181B or equivalent or consent of instructor. (S/U grades permitted.)

MATH 285A Stochastic Processes (4): Elements of stochastic processes, Markov chains, hidden Markov models, Poisson point processes, renewal processes martingales, Brownian motion, Gaussian processes, Kalman filter. Other topics to be selected by instructor depending on interest of class. Prerequisites: Math. 180A (or equivalent basic probability course) or consent of instructor.

MATH 287B Multivariate Analysis (4): Bivariate and more general multivariate normal distribution. Study of tests based on Hotelling’s T2. Principal components, canonical correlations, and factor analysis will be discussed as well as some competing nonparametric methods, such as cluster analysis. 

**Prerequisites:** Math 181B or equivalent, or consent of instructor.

MATH 287D Statistical Learning (4): Topics include regression methods: (penalized) linear regression and kernel smoothing; classification methods: logistic regression and support vector machines; model selection; and mathematical tools and concepts useful for theoretical results such as VC dimension, concentration of measure, and empirical processes. **Prerequisites:** Math 287C or consent of instructor.

CSE 202 Algorithm Design and Analysis (4): The basic techniques for the design and analysis of algorithms. Divide-and-conquer, dynamic programming, data structures, graph search, algebraic problems, randomized algorithms, lower bounds, probabilistic analysis, parallel algorithms. 

**Prerequisites:** CSE 101 or equivalent.

CSE250B Principles of Artificial Intelligence: Learning Algorithms (4): Algorithms for supervised and unsupervised learning from data. Content may include maximum likelihood, log-linear models including logistic regression and conditional random fields, nearest neighbor methods, kernel methods, decision trees, ensemble methods, optimization algorithms, topic models, neural networks and backpropagation. CSE 103 or similar course recommended.

CSE 255 Data mining and predictive analytics (4): Learning methods for applications. Content may include data preparation, regression and classification algorithms, support vector machines, random forests, class imbalance, overfitting, decision theory, recommender systems and collaborative filtering, text mining, analyzing social networks and social media, protecting privacy, A/B testing. **Prerequisites:** CSE 103 or similar recommended.

CSE 260 Parallel computation (4): An overview of parallel hardware, algorithms, models and software. Topics include Flynn's taxonomy, interconnection networks, memory organization, a survey of commercially available multiprocessors, parallel algorithm paradigms and complexity criteria, parallel programming environments and tools for parallel debugging, language specification, mapping, performance, etc. **Prerequisites:** Graduate standing or consent of instructor.


CSE 283 Bioinformatics III: Functional Genomics (4): Annotating genomes, characterizing functional genes, profiling, reconstructing pathways. **Prerequisites:** Pharm 201, BENG 202/CSE 282, or consent of instructor.

**Biostatistics MS Masters Examination**

A comprehensive final examination, called the Master’s Examination, will be given at least at the end of each Spring Quarter. Two failures to pass the Master’s Examination will result in a recommendation to the Dean of Graduate Division for disqualification of the student in the MS program. The Master’s Examination is developed and scored by the Division of Biostatistics and Bioinformatics within the Department of Family Medicine and Public Health (FMPH). The chair of the Biostatistics Graduate Program Committee will appoint an exam committee that will be responsible for preparing, administering
and grading the examination. The exam committee will forward its recommendation to the chair of the Graduate Program Committee, which will be the final arbiter of pass or fail.

Master of Advanced Studies – Leadership of Healthcare Organizations

Program Description

The master of advanced studies in the Leadership of Healthcare Organizations focuses on building leadership and management skills for healthcare professionals with an emphasis on clinical process improvement. The program is designed to equip graduates with the advanced knowledge and skills that are essential for managing the escalating challenges in today’s competitive healthcare environment. The curriculum integrates a focus on critical healthcare issues with foundational business knowledge such as finance, law, technology, and leadership topics including inspiring team performance and implementing organizational change. Through a highly interactive, seminar-style classroom environment with peers and faculty, participants directly apply recently learned business knowledge and insights to current healthcare situations and challenges.

The degree consists of 42 quarter units of study. Coursework can be completed in one, two or three years, depending upon a participant’s time to devote to the program. Students may enter the program in the fall (September), winter (January) or spring (April) quarters.

Degree Requirements

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th># of Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>LHCO 202</td>
<td>Strategic Management and Organizational Change</td>
<td>4</td>
</tr>
<tr>
<td>LHCO 203</td>
<td>Using and Managing Information and Information Technologies</td>
<td>4</td>
</tr>
<tr>
<td>LHCO 204</td>
<td>Conflict Resolution, Negotiation &amp; Team Building</td>
<td>2</td>
</tr>
<tr>
<td>LHCO 206</td>
<td>Topics in Financial Management and Decision-Making</td>
<td>2</td>
</tr>
<tr>
<td>LHCO 209</td>
<td>Outcomes and Quality Improvement</td>
<td>4</td>
</tr>
<tr>
<td>LHCO 212</td>
<td>Statistics and Applied Decision Making</td>
<td>2</td>
</tr>
<tr>
<td>LHCO 213</td>
<td>Financial Accounting and Analysis</td>
<td>2</td>
</tr>
<tr>
<td>LHCO 214</td>
<td>Practical Business Communication Skills for HC Professionals</td>
<td>2</td>
</tr>
<tr>
<td>LHCO 215</td>
<td>Modern Healthcare</td>
<td>2</td>
</tr>
<tr>
<td>LHCO 216</td>
<td>Healthcare Leadership</td>
<td>4</td>
</tr>
<tr>
<td>LHCO 217</td>
<td>Project Management for Healthcare Professionals</td>
<td>2</td>
</tr>
<tr>
<td>LHCO 218</td>
<td>Professional Development Seminar; Mentorship &amp; Assessment</td>
<td>2</td>
</tr>
<tr>
<td>LHCO 219</td>
<td>Process Improvement in Healthcare</td>
<td>4</td>
</tr>
<tr>
<td>LHCO 220</td>
<td>Topics in Health Law</td>
<td>2</td>
</tr>
<tr>
<td>LHCO 299</td>
<td>Independent Study Capstone Course</td>
<td>4</td>
</tr>
</tbody>
</table>

Current List of MAS-LHCO Degree Courses

MAS-LHCO Core Requirements
LHCO 202 Strategic Management and Organizational Change (4): This course examines principles and applications of strategic management and the change management concepts necessary to effectively apply these principles in healthcare organizations. The course will provide you with a structured stepwise approach to the strategic management process, and includes methods for assessing key features of organization environments and competitive situations, approaches for developing strategic plans, and processes for insuring the successful implementation of strategy.

LHCO 203 Using and Managing Information and Information Technologies (4): This course is designed to familiarize you with the principles of information systems design and management for healthcare. It will provide you with an understanding of current trends in information technologies for healthcare and management issues unique to the field. The course includes a hands-on computer lab.

LHCO 204 Conflict Resolution, Negotiation & Team Building (2): This course studies key management concepts and roles of management and how they apply in successful, dynamic organizations. You will examine the competencies of effective managers in developing customer focus, planning, selecting and developing individuals and teams, communicating, managing resources, using technology and being adaptable. You will be exposed to the theory and process of effective negotiation as well as various team building and conflict resolution strategies in a variety of contexts.

LHCO 206 Topics in Financial Management and Decision-Making (2): This course will present you with real-life applications in healthcare provider organizations of financial management and decision-making. Topics include budgeting, uses of financial reports, development of long-range financial forecasts, benchmarking, business plan development and actuarial analysis in projecting healthcare delivery costs.

LHCO 209 Outcomes and Quality Improvement (4): This course will provide you with a critical overview of the tools used to measure outcomes and quality of care, development and use of practical guidelines, advantages and disadvantages of various methods, and the use of such analysis in administrative decision-making.

LHCO 212 Statistics and Applied Decision Making (2): In this course, you will learn statistical methods and their most common applications in healthcare management. Topics covered will include data presentation, sampling, the development and use of confidence intervals, hypothesis testing, analysis of variance, and simple regression. You will also explore elementary probability theory and decision-making under uncertainty.

LHCO 213 Financial Accounting and Analysis (2): In this course, you will learn the use of financial information within a healthcare organization. Topics will include capital structure, working capital and cash management, the time value of money, and capital budgeting.

LHCO 214 Practical Business Communication Skills for HC Professionals (2): This course focuses on developing effective business communication skills for professionals in managerial/senior roles in healthcare. Writing scenarios include: preparing briefings and updates using presentation software and/or briefing packets; organizing data; constructing proposals and reports; solicitations; coordinating projects via email; and drafting and editing group documents. On-the-job examples from each student’s workplace are used throughout the course.

LHCO 215 Modern Healthcare (2): This course describes and analyzes the healthcare delivery system in the U.S. You will gain an understanding of the health policy process and how healthcare is financed. Organizational structures of institutions and professional groups are assessed. Actions taken by
employers, insurers, consumers, and government, and the effects on physicians and provider organizations are analyzed.

LHCO 216 Healthcare Leadership (4): This course describes the critical knowledge and skills needed to be effective leaders in today’s complex healthcare environment. The course sessions cover conflict resolution, leadership and negotiation skills, strategic planning, and ethics. Guest speakers include business leaders and entrepreneurs from the local healthcare industry.

LHCO 217 Project Management for Healthcare Professionals (2): This course covers the core body of knowledge and skills of project management specific to the healthcare industry. You will learn how to define, plan and execute a project on time, on budget and within performance specifications. Topics in the course include project life cycle, definition, and charter creation; assembling high performance teams; risk analysis; and project closure.

LHCO 218 Professional Development Seminar: Mentorship & Assessment (2): In this course, a faculty member will direct your study in the development of mentorship and leadership skills as related to your research interest. Readings, assignments, and formalized career assessment and mentoring sessions are designed to integrate coursework with the development of your independent study proposal on an applied research topic.

LHCO 219 Process Improvement in Healthcare (4): In this course you will learn and apply concepts and techniques of business process analysis and improvements as building blocks for operations improvement strategies in healthcare. You will analyze and improve processes in various contexts using different process improvement tools from simple process-mapping to computer-based process modeling. In addition, the use of fundamental and sophisticated analytical techniques to design and manage efficient and effective operations and processes will be covered. The importance of balancing technical/analytical and organizational/behavioral aspects of business process improvements will be highlighted.

LHCO 220 Topics in Health Law (2): This survey course introduces you to the relationship of law to healthcare, including liability, government regulation, financial and ethical issues, contracting and negotiation and dispute resolution. The course will incorporate the most current trends related to health law and feature guest speakers on relevant topics.

LHCO 299 Independent Study Capstone Course (4): The Capstone is the cornerstone of the MAS program. You will be involved in a high-level research project that integrates what you have learned in your formal coursework. The Capstone will be an independent and creative scholarly activity in an area related to one or more of the topics covered in the formal curriculum. Your work will be evaluated by a member(s) of the faculty and may also include industry advisors when appropriate.

**PhD in Biostatistics**

**Program Description**

PhD students are required to obtain 64 units of coursework from the following courses. For the MS degree the requirement is 52 units (48 units of required courses in Mathematical Statistics and Biostatistics and 4 units in Life Sciences). Full time graduate student must register for a minimum of 12 units per quarter. These 12 units can be made up of a combination of required coursework as described below, additional elective coursework if any, and special study courses (FMPH 297). All student course programs, as well as any changes throughout the quarter, must be approved by a faculty advisor prior to registering for classes each quarter.
Degree Requirements

<table>
<thead>
<tr>
<th>Course Title</th>
<th># of Units</th>
<th>Course Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dept. of Mathematics</td>
<td>24</td>
<td>MATH 281A-C, MATH 282A-B, MATH 284</td>
</tr>
<tr>
<td>Biostatistics</td>
<td>29</td>
<td>FMHP 221, FMHP 222, FMHP 223, FMHP 241, FMHP 290</td>
</tr>
<tr>
<td>Two Among the Following</td>
<td>8</td>
<td>FMHP 224, FMHP 225, FMHP 226, FMHP 227</td>
</tr>
<tr>
<td>Life Sciences</td>
<td>8</td>
<td>Upper division or graduate level in Biomedical Sciences, Neurosciences, Epidemiology, Public Health, Biology, Systems Biology, Bioengineering, or Medicine</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Elective (3-4 Units)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Biostatistics</td>
<td>3</td>
<td>FMHP 242</td>
</tr>
<tr>
<td>Computer Science</td>
<td></td>
<td>CSE 202, CSE 250B, CSE 255, CSE 260, CSE 283, ECE 273</td>
</tr>
</tbody>
</table>

Current List of Biostatistics PhD Degree Courses

Biostatistics PhD Core Requirements

FMPH 221 Biostatistical Methods I (4): Introductory graduate course on the analysis of biomedical data using the R statistical software. Topics include t-tests, ANOVAs, linear regression, model diagnostics, model building and selection, interaction, confounding, multiple comparisons, and robust tests based on ranks and resampling. Prerequisites: Biostatistics major or program/instructor approval.

FMPH 222 Biostatistical Methods II (4): Intermediate-level graduate course in the analysis of categorical data. Topics include generalized linear models (logistic, Poisson, loglinear models); splines and nonlinear regression; stratified and case-control studies. Maximum likelihood, quasi-likelihood and Bayesian approaches; large scale model selection and inference. Prerequisites: Successful completion of FMPH 221 and (Math 281A or Math 282A) or program/instructor approval.

FMPH 223 Analysis of Longitudinal Data (4): Covers analysis of longitudinal data, parametric modeling of covariance, generalized estimating equations, linear, nonlinear and generalized linear mixed effects models and modeling dropout in longitudinal studies. Data analysis and computational issues are emphasized. Prerequisites: Successful completion of FMPH 222 and (Math 281A and Math 282A or Math 281B and Math 282B) or program/instructor approval.

FMPH 224 Clinical Trials (4): Graduate class will cover statistical aspects of clinical trial design, monitoring, analysis and ethics of human subjects research. Data analysis and computation will be emphasized. Prerequisites: Successful completion of FMPH 221 and FMPH 222 or program/instructor approval.

FMPH 225 Advanced Topics in Biostatistical Inference (4): Graduate class will cover modern statistical inference including non-parametric statistics, estimating equations, resampling methods, and statistical learning. Data analysis and computation will be emphasized. Prerequisites: Successful completion of FMPH 221, FMPH 222, and FMPH 223 or program/instructor approval.

FMPH 226 Statistical Methods for Observational Studies (4): Graduate class is an introduction to inference and causal modeling for observational data, including propensity score adjustment, inverse
probability weighting, instrumental variables, and sensitivity analysis. Data analysis and computation will be required. **Prerequisites**: Successful completion of FMPH 221, FMPH 222, and FMPH 223 or program/instructor approval.

**FMPH 227 Applied Multivariate Statistical Analysis (4)**: Graduate course covers concepts, methods and applications of multivariate data analysis, including multivariate regression, principal components, clustering and functional data analysis. Data analysis will be emphasized. **Prerequisites**: Successful completion of FMPH 221 and FMPH 222 or program/instructor approval.

**FMPH 241 Biostatistics Rotation (3)**: This practicum provides hand-on experience with biomedical research and data analysis. Working within a specific biomedical domain (e.g., cancer, genomics, or physical activity research), students will conduct original data analysis, and prepare or substantially contribute to final project report. **Prerequisites**: Biostatistics major only.

**FMPH 242 Advanced Topics in Biostatistics (4)**: Biostatistics elective courses will be taught under this course heading. Courses will have a varying focus each year/quarter. Topics will include Random field theory and image analysis, advanced statistical computing, Bayesian methods and others. **Prerequisites**: Successful completion of FMPH 221 and FMPH 222 or program/instructor approval.

**FMPH 290 Biostatistics Journal Club and Seminar (1)**: This course requires attendance and participation in Division of Biostatistics seminar series and journal club. Students will critically read the assigned articles and participate in biweekly journal clubs. Students are also required to lead at least one journal club discussion. **Prerequisites**: Biostatistics major only

**FMPH 299 Thesis Research (1-12)**: Research in biostatistics under the supervision of major professor. (S/U grading only.) **Prerequisites**: advancement to Candidacy for PhD and consent of instructor.

**MATH 281A Mathematical Statistics (4)**: Statistical models, sufficiency, efficiency, optimal estimation, least squares and maximum likelihood, large sample theory. **Prerequisites**: advanced calculus and basic probability theory or consent of instructor.

**MATH 281B Mathematical Statistics (4)**: Hypothesis testing and confidence intervals, one-sample and two-sample problems. Bayes theory, statistical decision theory, linear models and regression. **Prerequisites**: advanced calculus and basic probability theory or consent of instructor.

**MATH 281C Mathematical Statistics (4)**: Nonparametrics: density estimation, regression, bootstrap and jackknife, testing. Introduction to statistical computing using S plus. **Prerequisites**: advanced calculus and basic probability theory or consent of instructor.

**MATH 282A-B Applied Statistics (4-4)**: Sequence in applied statistics. First quarter: general theory of linear models with applications to regression analysis. Second quarter: analysis of variance and covariance and experimental design. Third quarter: further topics to be selected by instructor. Emphasis throughout is on the analysis of actual data. **Prerequisite**: Math. 181B or equivalent or consent of instructor. (S/U grades permitted.)

**MATH 284 Survival Analysis (4)**: Survival analysis is an important tool in many areas of applications including biomedicine, economics, and engineering. It deals with the analysis of time to events data with censoring. This course discusses the concepts and theories associated with survival data and censoring, comparing survival distributions, proportional hazards regression, nonparametric tests, competing risk models, and frailty models. The emphasis is on semiparametric inference, and material is drawn from recent literature. **Prerequisites**: Math. 282A or consent of instructor.
Current Biostatistics PhD Degree Electives

MATH 202A Applied Algebra I (4): Introduction to algebra from a computational perspective. Groups, rings, linear algebra, rational and Jordan forms, unitary and Hermitian matrices, matrix decompositions, perturbation of eigenvalues, group representations, symmetric functions, fast Fourier transform, commutative algebra, Grobner basis, and finite fields. Prerequisites: graduate standing or consent of instructor.

MATH 240ABC Real Analysis (4): Lebesgue integral and Lebesgue measure, Fubini theorems, functions of bounded variations, Stieltjes integral, derivatives and indefinite integrals, the spaces L and C, equi-continuous families, continuous linear functionals general measures and integrations. Prerequisites: Math 140A-B-C.

MATH 271ABC Numerical Optimization (4): Formulation and analysis of algorithms for constrained optimization. Optimality conditions; linear and quadratic programming; interior methods; penalty and barrier function methods; sequential quadratic programming methods. Prerequisites: consent of instructor

MATH 280A-B-C Probability Theory (4-4-4): Probability measures; Borel fields; conditional probabilities, sums of independent random variables; limit theorems; zero-one laws; stochastic processes. Prerequisites: advanced calculus and consent of instructor.

MATH 285A Stochastic Processes (4): Elements of stochastic processes, Markov chains, hidden Markov models, Poisson point processes, renewal processes martingales, Brownian motion, Gaussian processes, Kalman filter. Other topics to be selected by instructor depending on interest of class. Prerequisites: Math. 180A (or equivalent basic probability course) or consent of instructor.


MATH 287B Multivariate Analysis (4): Bivariate and more general multivariate normal distribution. Study of tests based on Hotelling’s T2. Principal components, canonical correlations, and factor analysis will be discussed as well as some competing nonparametric methods, such as cluster analysis. Prerequisites: Math 181B or equivalent, or consent of instructor.

MATH 287D Statistical Learning (4): Topics include regression methods: (penalized) linear regression and kernel smoothing; classification methods: logistic regression and support vector machines; model selection; and mathematical tools and concepts useful for theoretical results such as VC dimension, concentration of measure, and empirical processes. Prerequisites: Math 287C or consent of instructor.

CSE 202 Algorithm Design and Analysis (4): The basic techniques for the design and analysis of algorithms. Divide-and-conquer, dynamic programming, data structures, graph search, algebraic problems, randomized algorithms, lower bounds, probabilistic analysis, parallel algorithms. Prerequisites: CSE 101 or equivalent.

CSE 250B Principles of Artificial Intelligence: Learning Algorithms (4): Algorithms for supervised and unsupervised learning from data. Content may include maximum likelihood, log-linear models including logistic regression and conditional random fields, nearest neighbor methods, kernel methods, decision trees, ensemble methods, optimization algorithms, topic models, neural networks and backpropagation. CSE 103 or similar course recommended.
CSE 250C Machine Learning Theory (4): Theoretical foundations of machine learning. Topics include concentration of measure, the PAC model, uniform convergence bounds and VC dimension. Possible topics include online learning, learning with expert advice, multiarmed bandits and boosting. 

**Prerequisites:** CSE 103 and CSE 101 or similar course recommended.

CSE 255 Data mining and predictive analytics (4): Learning methods for applications. Content may include data preparation, regression and classification algorithms, support vector machines, random forests, class imbalance, overfitting, decision theory, recommender systems and collaborative filtering, text mining, analyzing social networks and social media, protecting privacy, A/B testing. 

**Prerequisites:** CSE 103 or similar recommended.

CSE 260 Parallel computation (4): An overview of parallel hardware, algorithms, models and software. Topics include Flynn's taxonomy, interconnection networks, memory organization, a survey of commercially available multiprocessors, parallel algorithm paradigms and complexity criteria, parallel programming environments and tools for parallel debugging, language specification, mapping, performance, etc. 

**Prerequisites:** Graduate standing or consent of instructor.


**Prerequisites:** Pharm 201, BENG 202/CSE 282, or consent of instructor.

**Biostatistics PhD Qualifying Examinations**

**Preliminary Written Statistics and Biostatistics Examination**

The PhD Written Qualifying Examination has two parts: A statistical theory part, developed and scored by the Statistics Group within the Math Department; and a biostatistics part, developed and scored by the Division of Biostatistics and Bioinformatics within the Department of FMPH. The exam committees in charge may be different for each part of the exam. Whether or not students pass or fail is determined separately by the exam committees for the Statistical Theory part and the Biostatistics part of the exam. The student must pass at the PhD pass or provisional pass level. Each exam committee will forward its recommendation to the chair of the Graduate Program Committee, which will be the final arbiter of pass or fail.

**Life Sciences Qualifying Exam**

Students in the PhD program must also pass a Life Sciences Qualifying Examination. This consists of a seminar presentation of a statistical application in a particular area of life sciences. The presentation will be evaluated by an ad-hoc committee of three faculty members, including at least one outside (non-statistician) member with expertise in the area of application. The exam is taken Pass/Fail. The student is allowed two attempts at taking this exam. The student should pass this requirement prior to the end of the third year of study. The presentation will be evaluated on the students’ demonstration of a sufficient understanding of the area of application, and on the relevance of the statistical approach to this area.

**Advancement to Candidacy (Final Examination)**
It is expected that by the end of the third year (9 quarters), students should have a field of research chosen and a faculty member willing to direct and guide them. A student will advance to candidacy after successfully passing the oral qualifying examination, which deals primarily with the area of research proposed. The student will also have successfully completed at least 64 units of required and elective courses within the Program. Advisers must submit the Application for the Qualifying Exam (QE) four weeks prior to the exam date; exams taken before receiving Office of Graduate Division approval may be deemed null and void. Students must be registered during the quarters in which they take any portion of their QE.

**Biostatistics PhD Doctoral Dissertation**

The doctoral dissertation is an essential part of the PhD program. A topic will be selected by the student, under the advice and guidance of a Major Professor (thesis adviser) and a Dissertation Committee chaired by the Major Professor. At least one member of the committee must be a tenured faculty from outside the Biostatistics program; often this will be a member of the biomedical sciences faculty who can provide a motivating problem or data set from an area of application, in collaboration with the major advisor. Students are encouraged to begin some research activity as early as possible during the second year of their graduate studies, and to use the Biostatistics Rotation to assess potential thesis advisers. The dissertation must contain an original contribution of quality that would be acceptable for publication in the biostatistics literature that extends the theory or methodology of biostatistics, or extends biostatistical methods to solve a critical problem in applied disciplines.

**Dissertation Defense**

The entire dissertation committee will conduct a final oral examination, which will deal primarily with questions arising out of the relationship of the dissertation to the field of Biostatistics. The final examination will be conducted in two parts. The first part consists of a one-hour presentation by the candidate followed by a brief period of questions pertaining to the presentation; this part of the examination is open to the public. The second part of the examination will immediately follow the first part; this is a closed session between the student and the committee and will consist of a period of questioning by the committee members. Title and abstract of the oral presentation will be distributed to all faculty and students of departments that participate in the Biostatistics

**PhD in Bioinformatics and Systems Biology with Emphasis in Biomedical Informatics**

**Program Description**

The Bioinformatics and Systems Biology Graduate Program is organized around two disciplinary tracks that have distinct, yet overlapping, faculty and curricular requirements: Bioinformatics and Systems Biology (BISB) and Biomedical Informatics (BMI). Students indicate their interest in one track, but are able to request a switch at any time during their study. For each Track there are four required Core Courses (generally completed within the first year) and 16 units to be chosen from a list of Elective fields to be completed within the first two years. All required Core and Elective courses for the degree must be taken for a letter grade. Students must obtain a “B” or better in courses taken for the degree. If you receive a “B-” or lower in a Core or Elective class, or you take it on S/U grading, it does not fulfill your requirements. Please see the Grades FAQ if you have any grades of “B-” or lower or “U”.

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The Core Curriculum ensures that every student within the Program has the same knowledge basis in key areas of Bioinformatics, Systems Biology, and Biomedical Informatics. The Electives are intended to provide students with in-depth courses related to their own research interests.

**Degree Requirements**

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<tr>
<th>BIOMEDICAL INFORMATICS CORE (8 UNITS)</th>
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<tr>
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<td>MED 265</td>
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<td>MED 262 (Seminar)</td>
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<th>NON-COURSE REQUIREMENTS</th>
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<td>Qualifying Examinations</td>
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**Current List of Bioinformatics PhD Degree Courses**

**Bioinformatics PhD Core Requirements**

**BENG 202 Bioinformatics II: Introduction to Bioinformatics Algorithms (4):** Introduction to methods for sequence analysis. Application to genome and proteome sequences. Protein structure, sequence-structure analysis. **Prerequisites:** Pharm 201 or consent of instructor. BIOM 219

**BIOM 219/SOMI 226 Ethics in Scientific Research (1):** Overview of ethical issues in scientific research, conflicts of interest; national, statewide and campus issues and requirement; ethical issues in publications; authorship; retention of research records; tracing of research records; attribution; plagiarism; copyright considerations; primary, archival and meeting summary publications; ethical procedures and policies; NIH, NSF, California and UCSD; case studies and precedents in ethics. **Prerequisites:** consent of instructor.

**BNFO 283 Bioinformatics Student Research Talks (1):** Weekly presentations by bioinformatics and systems biology students about research projects that are proposed or completed. Faculty mentors are
present to contribute critiques and suggestions. S/U grades only. May be taken for credit nine times. 

**Prerequisites:** bioinformatics and systems biology program graduate students only.

**BNFO 298 Research Rotation (4–8):** Laboratory research of special topics under the direction of a program faculty member. The purpose is to train students in specific research methodologies and identify a laboratory in which to pursue doctoral dissertation research. Three quarters are required for PhD candidates. May be taken for credit six times. **Prerequisites:** bioinformatics graduate students and consent of instructor and program.

**BNFO 299 Graduate Research (1–12):** Independent work by graduate students engaged in research and writing theses. S/U grades only. May be taken for credit fifteen times. **Prerequisites:** bioinformatics and systems biology graduate students and consent of instructor.

**BNFO 500 Teaching Assistantship (2–4):** Teaching experience in an appropriate bioinformatics undergraduate or graduate course under direction of the faculty member in charge of the course. Each PhD candidate must complete two academic quarters of experience for S/U grade only. May be taken for credit four times. **Prerequisites:** graduate standing and consent of instructor (department stamp).

**MED 262 Current Trends in Biomedical Informatics (1):** Weekly talks by researchers introduce students to current research topics within BMI. Speakers are drawn from academia, health care organizations, industry, and government.

**MED 263 Bioinformatics Applications to Human Disease (4):** Students learn background knowledge and practical skills for investigating the biological basis for human disease. Using bioinformatics applications, they: (1) query biological and genetic sequence databases relevant to human health, (2) manipulate sequence data for alignment, recombination, selection, and phylogenetic analysis, (3) normalize microarray data and identify differentially expressed genes and biomarkers between patient groups, (4) annotate protein data and visualize protein structure, and (5) search the human genome and annotate genes relevant to human diseases.

**MED 264 Principles of Biomedical Informatics (4):** Students are introduced to the fundamental principles of BMI and to the problems that define modern healthcare. The extent to which BMI can address healthcare problems is explored. Topics covered include structuring of data, computing with phenotypes, integration of molecular, image and other non-traditional data types into electronic medical records, clinical decision support systems, biomedical ontologies, data and communication standards, data aggregation, and knowledge discovery.

**MED 265 Informatics in Clinical Environments (4):** Students are introduced to the basics of healthcare systems and clinical information needs through direct observation and classroom discussion. Students are introduced to medical language, disease processes, and health care practices to provide context prior to direct patient observation at primary, specialty, emergency, and inpatient sites in conjunction with clinical faculty affiliated with the training program. Students examine how clinicians use history-taking, physical examination and diagnostic testing to establish diagnoses and prognoses. Medical decision-making is introduced in the context of available informatics tools and clinical documentation and communication processes. Post-observation classroom discussions encourage students to think critically of the processes they observed and formulate hypotheses about how informatics solutions can modify the processes.

**MED 267 Modeling Clinical Data and Knowledge for Computation (4):** This course describes existing methods for representing and communicating biomedical knowledge. The course describes existing health care standards and modeling principles required for implementing data standards, including biomedical ontologies, standardized terminologies, and knowledge resources.
Additionally, our elective courses may be of interest depending on the trainee’s elected track in public health.

**MED 268 Statistics Concepts for Biomedical Research (4):** This course introduces statistics methods for basic, pre-clinical, and clinical research. Topics include descriptive statistics, t-tests, ANOVA, linear and logistic regression, survival analysis, power and sample size, non-parametric methods, and factorial experiment design. Emphasis is on applications rather than theorems and proofs. Students will gain the ability to design efficient and informative basic research and clinical trials, to perform statistical analyses using the R statistics software, and to critique statistical results in published biomedical research.

**MED 269 Clinical Decision Support Systems at the Point of Care (4):** Students learn about modeling knowledge to facilitate improved decision-making. The course includes review and discussion of case studies of specific health-related decision-support systems. Through discussions, assignments, and group projects, students learn the analytic techniques behind decision support systems as well as topics within decision-making under uncertainty, decision analysis, and evaluation of decision support systems.

**MED 273 Communicating Biomedical Informatics (4):** Students learn writing techniques for communicating scientific and engineering knowledge to audiences ranging from specialist to general communities. Starting with a review of grammar and sentence structure, the course will lead into different forms of science and engineering writing, including popular pieces, blogs, specifications, reviews, and research papers. Additionally, techniques to improve scientific presentation skills in oral form will be offered.

**MED 276 Grant Proposal Writing Practicum (2):** The focus of this course will be on grant writing and developing persuasive arguments. Previously submitted funded and non-funded grants will be used to illustrate revision and response to reviewers, as well as to provide source materials to perform mock study section reviews. This course will help students write their first grant proposal and understand the process of proposal scoring and reviewing.

**MED 277 Introduction to Biomedical Natural Language Processing (4):** Biomedical Natural Language Processing (BioNLP) is an essential tool in both biomedical research and clinical applications. Students taking this course will learn how to process free text data and their integration with other types of biomedical data with BioNLP.

**MED 278 Cancer Genomics Journal Club (1):** This course is a weekly journal club focused on cancer genomics. With the advances in sequencing and big data analysis, the field of cancer genomics has become extremely complex and sometimes not approachable by biology or medical students. On the other hand, engineers, mathematicians or computational biologist sometimes struggle to identify concrete application of their work to the medical and healthcare field. This journal club will offer to both categories of students a venue to get exposure to some of the most advances progress in the field for cancer genomics and precision medicine. Students will learn the state of the art methods and latest findings in cancer genomics, and learn how to critically review such results and place them in the context of other studies and findings.

**Current Bioinformatics PhD Degree Electives**

**Biochemistry**

**BENG 230A Biochemistry (4):** A graduate course in biochemistry especially tailored to the requirements and background of bioengineering graduate students. It will cover the important macro- and small molecules in cells that are the major constituents, or that function as signaling molecules or molecular
machineries. The structures, pathways, interactions, methodologies, and molecular designs using recombinant DNA technology will be covered. **Prerequisites:** restricted to bioengineering graduate students with major code BE75. (F)

**CHEM 209 Macromolecular Recognition (4):** Structures and functions of nucleic acids, folding and catalysis of nucleic acids, motifs and domains of proteins, principles of protein-protein interactions, chemistry of protein/DNA and protein/RNA interfaces, conformational changes in macromolecular recognition. **Prerequisites:** biochemistry background and graduate standing, or approval of instructor.

**CHEM 213A Structure of Biomolecules and Biomolecular Assemblies (4):** A discussion of structures of nucleic acids and proteins and their larger assemblies. The theoretical basis for nucleic acid and protein structure, as well as methods of structure determination including X-ray crystallography, cryoEM, and computational modeling approaches will be covered. Letter grades only. **Prerequisites:** graduate standing.

**CHEM 213B Biophysical Chemistry of Macromolecules (4):** Renumbered from CHEM 213. A discussion of the physical principles governing biomolecular structure and function. Experimental and theoretical approaches to understand protein dynamics, enzyme kinetics, and mechanisms will be covered. Students may only receive credit for one of the following: CHEM 213 or 213B. May be co-scheduled with CHEM 113.

**CHEM 216 Chemical Biology (4):** A discussion of current topics in chemical biology including mechanistic aspects of enzymes and cofactors, use of modified enzymes to alter biochemical pathways, chemical intervention in cellular processes, and natural product discovery. **Prerequisites:** graduate standing or consent of instructor. (May not be offered every year.)

**Molecular Genetics**

**BICD 100 Genetics (4):** An introduction to the principles of heredity emphasizing diploid organisms. Topics include Mendelian inheritance and deviations from classical Mendelian ratios, pedigree analysis, gene interactions, gene mutation, linkage and gene mapping, reverse genetics, population genetics, and quantitative genetics. **Prerequisites:** BILD 1.

**BGGN 220D Chromatin Structure and Transcriptional Regulation (2):** The course covers chromatin structure and dynamics as well as the regulation of transcription initiation by RNA polymerase II. The format includes lectures and discussion of selected papers.

**BGGN 220E Post-Transcriptional Gene Regulation (2):** The course covers mechanisms of gene regulation at the post-transcriptional level, including RNA processing, translation, and mRNA turnover. The format includes lectures and discussion of selected papers.

**BGGN 220F Shaping Cellular Function through Post-Translational Regulation (2):** The course will cover post-translational control mechanisms governing cellular activity. The course will traverse molecular and systems-level approaches aimed at understanding the governing principles of post-translational regulation and the consequences of improper regulation. The format includes lectures and discussion of selected papers.

**BGGN 223 Graduate Genetics (6):** Provides a broad and extensive advanced-level coverage of molecular and formal aspects of genetics for first-year graduate students. Topics covered include: bacterial genetics, recombination in prokaryotes and eukaryotes, mammalian somatic-cell genetics, developmental genetics, sex determination, dosage compensation, and immunogenetics. Extensive coverage of the use of model systems like Drosophila and C. elegans is included. General and specific
aspects of cellular signaling mechanisms will be covered. **Prerequisites:** BGGN 220; open only to students enrolled in a doctoral degree program. Letter grades only.

**Cell Biology**

**BICD 110 Cell Biology (4):** The structure and function of cells and cell organelles, cell growth and division, motility, cell differentiation and specialization. **Prerequisites:** BIBC 100 or BIBC 102.

**BICD 130 Embryos, Genes, and Development (4):** Developmental biology of animals at the tissue, cellular, and molecular levels. Basic processes of embryogenesis in a variety of invertebrate and vertebrate organisms. Cellular and molecular mechanisms that underlie cell fate determination and cell differentiation. More advanced topics such as pattern formation and sex determination are discussed. Open to upper-division students only. **Prerequisites:** upper-division standing; BICD 100; BIBC 100 or BIBC 102; BICD 110 strongly recommended, BIMM 100 strongly recommended.

**BGGN 222 Graduate Cell Biology (6):** Provides coverage of modern cell biology for first year graduate students. There is an up-to-date discussion of topics such as: structure and function of membranes; ion pumps, ion channels, transmembrane signaling; receptor mediated endocytosis; protein targeting; the role of RER and Golgi apparatus; the biosynthesis of intracellular organelles in animal and plant cells; the cytoskeleton, motility, molecular motors, cell-cell interactions, mitosis; and the control of cell division. Also included are extensive coverage of cell signaling mechanisms and discussions on molecular approaches to cell biology. **Prerequisites:** BGGN 220; open only to students enrolled in a doctoral degree program. Letter grades only.

**CHEM 221 / BGGN 230 Signal Transduction (4):** The aim of this course is to develop an appreciation for a variety of topics in signal transduction. We will discuss several historical developments while the focus will be on current issues. Both experimental approaches and results will be included in our discussions. Topics may vary from year to year. **Prerequisites:** biochemistry and molecular biology. (May not be offered every year.)

**Algorithms**

**CSE 101 Design and Analysis of Algorithms (4):** Design and analysis of efficient algorithms with emphasis of nonnumerical algorithms such as sorting, searching, pattern matching, and graph and network algorithms. Measuring complexity of algorithms, time and storage. NP-complete problems. Credit not offered for both Math 188 and CSE 101. Equivalent to Math 188. **Prerequisites:** CSE 12, CSE 21 or Math 15B, or Math 100A, or Math 103A and CSE 100, or Math 176.

**CSE 200 Computability and Complexity (4):** Computability review, including halting problem, decidable sets, r.e. sets, many-one reductions; TIME(t(n)), SPACE(s(n)) and general relations between these classes; L, P, PSPACE, NP; NP-completeness; hierarchy theorems; RP, BPP. **Prerequisites:** CSE 105 or equivalent.

**CSE 202 Algorithm Design and Analysis (4):** The basic techniques for the design and analysis of algorithms. Divide-and-conquer, dynamic programming, data structures, graph search, algebraic problems, randomized algorithms, lower bounds, probabilistic analysis, parallel algorithms. **Prerequisites:** CSE 101 or equivalent.

**CSE 280A Algorithms in Computational Biology (4):** (Formerly CSE 206B.) The course focuses on algorithmic aspects of modern bioinformatics and covers the following topics: computational gene hunting, sequencing, DNA arrays, sequence comparison, pattern discovery in DNA, genome
rearrangements, molecular evolution, computational proteomics, and others. **Prerequisites:** CSE 202 preferred or consent of instructor.

**MATH 261A Probabilistic Combinatorics and Algorithms (4):** Introduction to the probabilistic method. Combinatorial applications of the linearity of expectation, second moment method, Markov, Chebyshev, and Azuma inequalities, and the local limit lemma. Introduction to the theory of random graphs. **Prerequisites:** graduate standing or consent of instructor.

### Machine Learning and Data Mining

**CSE 250A Principles of Artificial Intelligence: Probabilistic Reasoning and Learning (4):** Methods based on probability theory for reasoning and learning under uncertainty. Content may include directed and undirected probabilistic graphical models, exact and approximate inference, latent variables, expectation-maximization, hidden Markov models, Markov decision processes, applications to vision, robotics, speech, and/or text. Recommended preparation: CSE 103 or similar course. **Prerequisites:** graduate standing in CSE or consent of instructor.

**CSE 250B Principles of Artificial Intelligence: Learning Algorithms (4):** Algorithms for supervised and unsupervised learning from data. Content may include maximum likelihood; log-linear models, including logistic regression and conditional random fields; nearest neighbor methods; kernel methods; decision trees; ensemble methods; optimization algorithms; topic models; neural networks; and backpropagation. Recommended preparation: CSE 103 or similar course. **Prerequisites:** graduate standing or consent of instructor.

**CSE 255 Data Mining and Predictive Analytics (4):** Learning methods for applications. Content may include data preparation, regression and classification algorithms, support vector machines, random forests, class imbalance, overfitting, decision theory, recommender systems and collaborative filtering, text mining, analyzing social networks and social media, protecting privacy, A/B testing. Recommended preparation: CSE 103 or similar. **Prerequisites:** graduate standing or consent of instructor.

### Mathematics and Statistics

**MATH 274 Numerical Methods for Physical Modeling (4):** (Conjoined with Math 174.) Floating point arithmetic, direct and iterative solution of linear equations, iterative solution of nonlinear equations, optimization, approximation theory, interpolation, quadrature, numerical methods for initial and boundary value problems in ordinary differential equations. Students may not receive credit for both Math 174 and PHYS 105, AMES 153 or 154. (Students may not receive credit for Math 174 if Math 170A, B, or C has already been taken.) Graduate students will complete an additional assignment/exam. **Prerequisites:** Math 20D or 21D, and either Math 20F or Math 31AH, or consent of instructor.

**MATH 280A Probability Theory I (4):** This is the first course in a three-course sequence in probability theory. Topics covered in the sequence include the measure-theoretic foundations of probability theory, independence, the Law of Large Numbers, and convergence in distribution, the Central Limit Theorem, conditional expectation, martingales, Markov processes, and Brownian motion. Recommended preparation: completion of real analysis equivalent to Math 140A-B strongly recommended. **Prerequisites:** graduate standing.

**MATH 281A Mathematical Statistics (4):** Statistical models, sufficiency, efficiency, optimal estimation, least squares and maximum likelihood, large sample theory. **Prerequisites:** advanced calculus and basic probability theory or consent of instructor.
MATH 281B Mathematical Statistics (4): Hypothesis testing and confidence intervals, one-sample and two-sample problems. Bayes theory, statistical decision theory, linear models and regression. **Prerequisites:** advanced calculus and basic probability theory or consent of instructor.

PHYS 210A Equilibrium Statistical Mechanics (5): Approach to equilibrium: BBGKY hierarchy; Boltzmann equation; H-theorem. Ensemble theory; thermodynamic potentials. Quantum statistics; Bose condensation. **Interacting** systems: Cluster expansion; phase transition via mean-field theory; the Ginzburg criterion. **Prerequisites:** Physics 200A-B. Corequisites: Physics 212C.

PHYS 210B Nonequilibrium Statistical Mechanics (4): Transport phenomena; kinetic theory and the Chapman-Enskog method; hydrodynamic theory; nonlinear effects and the mode coupling method. Stochastic processes; Langevin and Fokker-Planck equation; fluctuation-dissipation relation; multiplicative processes; dynamic field theory; Martin-Siggia-Rose formalism; dynamical scaling theory. **Prerequisites:** Physics 210A.

Biological Systems

BENG 211 Systems Biology and Bioengineering I: Biological Components (4): Components of biological systems, their biochemical properties and function. The technology used for obtaining component lists. Relationship within and integration of component lists. Structured vocabularies and component ontologies. Algorithms for comparative approaches in deciphering and mining component lists. **Prerequisites:** BENG 230A or BIMM 100, or consent of instructor.

BENG 212 Systems Biology and Bioengineering II: Network Reconstruction (4): This course will cover the process of reconstructing complex biological reaction networks. Reconstruction of metabolic networks, regulatory networks and signaling networks. Bottom-up and top-down approaches. The use of collections of historical data. The principles underlying high-throughput experimental technologies and examples given on how this data is used for network reconstruction, consistency checking, and validation. **Prerequisites:** BENG 211 or consent of instructor.

BENG 227 Transport Phenomena in Living Systems (4): This course describes the movement of heat and chemical mass in biological systems. Diffusion, convection and biochemical reactions in a variety of biological and engineering examples are analyzed and modeled. Students that have taken BENG 222 cannot take BENG 227 for credit. **Prerequisites:** BENG 221, graduate standing, or consent of instructor.

Kinetic Modeling

BENG 125 Modeling and Computation in Bioengineering (4): Computational modeling of molecular bioengineering phenomena: excitable cells, regulatory networks, and transport. Application of ordinary, stochastic, and partial differential equations. Introduction to data analysis techniques: power spectra, wavelets, and nonlinear time series analysis. **Prerequisites:** BENG 122A or BENG 123 or consent of department.

BNFO 284 Nonlinear Dynamics in Quantitative Biology (4): Qualitative, analytical and computational mathematical modeling techniques applied to regulatory networks and signaling networks. Stability, bifurcations, oscillations, multistability, hysteresis, multiple time-scales, and chaos. Introduction to experimental data analysis and control techniques. Applications to synthetic biology, cellular population dynamics, ad canonical signaling networks (inflammation, tumor suppression, metabolism). Letter grades only. **Prerequisites:** bioinformatics and systems biology graduate students only.
PHYS 276 Quantitative Molecular Biology (4): A quantitative approach to gene regulation, including transcriptional and posttranscriptional control of gene expression, as well as feedback and stochastic effects in genetic circuits. These topics will be integrated into the control of bacterial growth and metabolism. Recommended preparation: an introductory course in biology is helpful but not necessary.

CHEM 220 Regulatory Circuits in Cells (4): Modulation cellular activity and influencing viral fate involve regulatory circuits. Emergent properties include dose response, cross-regulation, dynamic, and stochastic behaviors. This course reviews underlying mechanisms and involves mathematical modeling using personal computer tools. Recommended: some background in biochemistry and/or cellular biology. Mathematical competence at the level of lower-division college courses.

Quantitative Biology

BENG 226 Foundations of Biomechanics (4): Modern development of biomechanics at an advanced mathematical level. Description of internal stresses and deformation in living tissues and fluids, thermodynamics. Mechanics of soft connective tissue, extracellular matrix, cells, membranes, and cytoskeleton. Mechanotransduction, migration, adhesion. Blood flow in microvessels. Biomechanical analysis of tissue injury. Students that have taken BENG 222 cannot take BENG 226 for credit. Recommended preparation: A previous background in biomechanics is strongly recommended prior to taking this course. Prerequisites: graduate standing or consent of instructor. (S)

BENG 235 Molecular Imaging and Quantitation in Living Cells (4): This course will introduce quantitative fluorescence microscopy techniques for imaging, manipulating, and quantifying the spatiotemporal characteristics of molecular events in live cells. A laboratory component will be integrated with students organized into small teams for projects. Recommended preparation: basic optics at the level of ECE 181, introductory molecular and cellular biology at the level of BIMM 100 and BICD 110, respectively. Prerequisites: graduate standing or consent of instructor. (S)

BGGN 214 Introduction to Q-Biology (4): The course goal is to discuss and work through examples where quantitative biology approaches were necessary to yield novel biological insights. Problems will be presented with a historic perspective to instill a philosophy for when, how, and why q-bio approaches are most effective. The course may also appeal to physics and engineering graduate students. Prerequisites: graduate standing or consent of instructor.

MAE 263 Experimental Methods in Cell Mechanics (4): Methods to measure mechanical aspects of cellular nature and behavior such as intracellular rheology, intracellular force distribution and propagation, cell adhesion strength, generation of propulsive forces during locomotion, interaction with the extracellular matrix, and response to external mechanical stimuli. Prerequisites: MAE 209 or MAE 210A or MAE 131A, or consent of instructor.

PHYS 273 Information Theory and Pattern Formation in Biological Systems (4): This course discusses how living systems acquire information on their environment and exploit it to generate structures and perform functions. Biological sensing of concentrations, reaction-diffusion equations, the Turing mechanism, and applications of information theory to cellular transduction pathways and animal behavior will be presented. Recommended preparation: familiarity with probabilities at the level of undergraduate statistical mechanics and major cellular processes; basic knowledge of information theory.

PHYS 274 Stochastic Processes in Population Genetics (4): The course explores genetic diversity within biological populations. Genetics fundamentals, mutation/selection equilibria, speciation, Wright-Fisher model, Kimura’s neutral theory, Luria-Delbrück test, the coalescent theory, evolutionary games and statistical methods for quantifying genetic observables such as SNPs, copy number variations, etc.,
will be discussed. Recommended preparation: familiarity with probabilities and PDEs at the undergraduate level; an introduction to basic evolutionary processes.

**PHYS 275 Fundamentals of Biological Physics (4):** This course teaches how quantitative models derived from statistical physics can be used to build quantitative, intuitive understanding of biological phenomena. Case studies include ion channels, cooperative binding, gene regulation, protein folding, molecular motor dynamics, cytoskeletal assembly, and biological electricity. Recommended preparation: an introduction to statistical mechanics, at least at the level of Physics 140A or Chemistry 132.

**PHYS 277 Physics of the Cell (4):** The use of dynamic systems and nonequilibrium statistical mechanics to understand the biological cell. Topics chosen from chemotaxis as a model system, signal transduction networks and cellular information processing, mechanics of the membrane, cytoskeletal dynamics, nonlinear Calcium waves. The graduate version will include a report at the level of a research paper. May be scheduled with Physics 177. Recommended preparation: an introductory course in biology is helpful but not necessary.

**Joint Doctoral Program in Public Health (UC San Diego/San Diego State University)**

**Epidemiology Program Description**

Epidemiology is an essential scientific discipline in public health, which deals with the causes and prevention of human disease. Our understanding of the etiology of many infectious and chronic diseases is based on data from epidemiological studies. The PhD in Epidemiology trains individuals for careers in research and teaching in a variety of settings, including academic and research institutions, government agencies, and the private sector.

A PhD degree in Public Health Epidemiology is offered through the Joint Doctoral Program (JDP). This is a collaborative effort between two academic institutions, San Diego State University (SDSU) and the University of California, San Diego. The Epidemiology track is the oldest of the three existing tracks, having been established in 1990. The doctoral program is research-intensive, where students work closely with faculty members from both SDSU and UCSD in developing research skills necessary to be future leaders in research and teaching of epidemiology.

**Degree Requirements**

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<th>Number of Units</th>
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<td>PH 623 (SDSU)</td>
<td>Epidemiological Methods</td>
<td>3</td>
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<td>PH 724 (SDSU)</td>
<td>Advanced Epidemiological Methods</td>
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<tr>
<td>FPM 259 ABC (UCSD)</td>
<td>Applied Epidemiology</td>
<td>4 (x3 Quarters)</td>
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<tr>
<td>PH 800 (SDSU)</td>
<td>Doctoral Seminar</td>
<td>2 (x2 Quarters)</td>
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<tr>
<td>FPM 258 ABC (UCSD)</td>
<td>Public Health Doctoral Lecture Series I</td>
<td>2 (x3 Quarters)</td>
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**REQUIRED COURSES**

**DESIGN COURSES (2 OF THE FOLLOWING)**

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<td>FPM 285 (UCSD)</td>
<td>Clinical Trials Issues &amp; Dilemmas</td>
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Global Health Program Description

The Joint Doctoral Program in Public Health between UCSD and SDSU-GLOBAL Health track. Students have the opportunity to obtain a PhD degree in public health with a concentration in global health.

The goal of this program is to prepare graduates for careers in public health research, practice and teaching. Upon graduation, students with a PhD in Public Health will be able to:

- Describe the distribution and determinants of health and disease in populations, and the factors that influence these distributions.
- Describe major national and international health concerns, their established risk factors and other contributing factors for these problems.
- Identify the ethical issues involved with studies of human populations.
- Develop a systematic approach for planning, collecting, processing and analysis of information and data in research and practice settings.
- Identify and apply appropriate analytic and statistical methods to data generated from a wide variety of public health research.
- Translate public health research findings into recommendations for specific interventions, health policies, or further investigative research.
- Communicate scientific findings clearly and concisely to other health professionals, both orally and in writing, as well as to the media and broader community.
- Develop and write fundable research proposals and critique those of other investigators.
- Demonstrate the ability to plan and successfully complete independent research addressing a public health problem.

Degree Requirements

<table>
<thead>
<tr>
<th>REQUIRED COURSES (SDSU: 11 UNITS; UCSD 18 UNITS)</th>
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<tbody>
<tr>
<td>Course Number</td>
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<tr>
<td>PH 823 (SDSU)</td>
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<td>PH 824 (SDSU)</td>
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<tr>
<td>BIOSTATISTICS (11 UNITS)</td>
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<td>PH 628 (SDSU)</td>
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<td>PH 700A (SDSU)</td>
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<td>PH 827 (SDSU)</td>
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<tr>
<td>ELECTIVES (15 UNITS)</td>
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<tr>
<td>15 Units in Specialized Area</td>
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<tr>
<td>NON-COURSE REQUIREMENTS</td>
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<tr>
<td>Teaching Experience</td>
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<tr>
<td>Research &amp; Dissertation</td>
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<tr>
<td>Epidemiology Research Exchange Conference</td>
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</table>
**PH 601, PH 602, PH 603, PH 627**  
SDSU Prerequisites  
3 Each

PH 780 (SDSU) – YR1  
Global Health I  
3

PH 800 (SDSU) – YR1  
Professional Seminar in Public Health  
2

PH 850 (SDSU) – YR1  
Global Health Practicum  
3

PH 880 (SDSU) – YR1  
Program Planning and Evaluation  
3

FPM 258A (UCSD) – YR2  
Public Health Doctoral Lecture Series I  
2

FPM 258B (UCSD) – YR2  
Public Health Doctoral Lecture Series II  
2

FPM 258C (UCSD) – YR2  
Public Health Doctoral Lecture Series III  
2

FPM 270 (UCSD) – YR2  
Cultural Perceptions about Health and Disease  
4

FPM 280B (UCSD) – YR2  
Practicum in Health Behavior II  
4

FPM 280C (UCSD) – YR2  
Practicum in Health Behavior III  
4

**ELECTIVES (SDSU 13 UNITS; UCSD 18 UNITS)**

<table>
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<th>SDSU Year 1 Recommended Courses</th>
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<tr>
<th>UCSD Year 2 Elective Courses</th>
<th>2 Each</th>
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<tr>
<th>UCSD Year 2 Elective Courses</th>
<th>4 Each</th>
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FPM 297  
Non-Course Requirements

| Teaching Experience | Oral & Written Qualifying Exams; Formal Defense of Dissertation | Public Health Research and Practice |

**Health Behavior Program Description**

A PhD in public health with a concentration in health behavior is offered by the joint faculties of the Department of Family and Preventive Medicine, School of Medicine at UCSD, and the Division of Health Promotion, Graduate School of Public Health at SDSU. Emphasis is on producing graduates with a mastery of the central concepts and analytic processes of health behavior.

Graduates of the program are expected to have the following advanced skills: behavior change theories and strategies for population application, qualitative and quantitative research methods, and the application of interventions and research methods to health behavior in disenfranchised populations, and to understand and change health policy.

**Degree Requirements**

**REQUIRED COURSES (SDSU: 21 UNITS; UCSD 32 UNITS)**

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Number of Units</th>
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PH 623 (SDSU) – YR1  
Epidemiological Methods  
3

PH 627 (SDSU) – YR1  
Advanced Statistical Methods in Public Health  
3

PH 800 (SDSU) – YR1  
Research Methods  
3

PH 862 (SDSU) – YR1  
Advanced Theoretical Foundations of Health Promotion & Behavioral Science  
3
Current List of JDP PH Degree Courses

**JDP PH Core Requirements (UC San Diego)**

**FPM 233 Clinical Nutrition (2):** Clinical nutrition is the study of nutrition and diet as related to the prevention and treatment of human disease. Nutrition is an interdisciplinary field of study, built on a foundation of biomedical and behavioral sciences. This course emphasizes class discussion of clinical topics and assigned readings in current areas of research and practice (i.e., diet and cancer, vitamin and other diet supplements), with case studies and illustrative class exercises.

**FPM 237 Microarray Technologies and Informatics (2):** This course is an introduction to microarray technology and analysis of gene expression data. This ten-lecture course will cover a range of microarray topics including platform types. Image processing, experimental design, and statistical analysis and application in medicine and health sciences.

**FPM 244 Clinical and Public Health Elective, Baja California, Mexico (2):** (Cross-listed with MED 248) Integrated clinical and public health experience with U.S. and Mexican graduate student and faculty teams over three to four days in Baja California, Mexico; emphasis on common clinical and public health problems in underserved populations. Minimal working knowledge of Spanish recommended. May be taken for credit four times. **Prerequisites:** UCSD School of Medicine student and graduate students with consent of instructor.

**FPM 246 Occupational/Environmental Health (2):** An introduction to the history and epidemiology of work-related disease. A review of occupational-related health problems, i.e., heart disease, pneumoconiosis, peripheral neuropathy, sterility, birth defects, psychiatric problems. Emphasis on the
occupational history in the diagnosis of job-related disease and disability. Major modalities of prevention and control will be presented and the role of health practitioners, government, management and labor will be reviewed. The course will include guest lecturers, films, videotapes and field visits to local industries and/or clinicians treating occupational diseases. **Prerequisites:** SM 208.

**FPM 247 Clinical Epidemiology Seminar (2):** This seminar is designed to expand the student’s understanding of clinical epidemiology by investigating several major controversial issues, such as treatment of breast cancer, oral hypoglycemic in diabetes, and dietary habits as a risk factor for coronary artery disease. The seminar will address clinical and methodological issues in the epidemiology of various chronic diseases.

**FPM 257 Cancer: Cause and Prevention (2):** This course will provide an overview of the problem of cancer and its avoidable causes. It covers some of the hottest topics currently facing cancer prevention professional as they try to prevent cancer from occurring in the first place and delay its progression.

**FPM 258A Public Health Doctoral Lecture Series I (2):** This first quarter of a three quarter sequence combines didactic instruction, interactive sessions and student presentations. Topics cover study design, ethics, data analysis and management techniques, and qualitative research will be presented. Focus: lectures (different from II or III). **Prerequisites:** Joint Doctoral Program in Public Health graduate student, School of Medicine student.

**FPM 258B Public Health Doctoral Lecture Series II (2):** This second quarter of a three quarter sequence combines didactic instruction, interactive sessions and student presentations. Topics cover study design, ethics, data analysis and management techniques, and qualitative research will be presented. Focus: lectures (different from I or II). **Prerequisites:** Joint Doctoral Program in Public Health graduate student, School of Medicine student, FPM 258A.

**FPM 258C Public Health Doctoral Lecture Series III (2):** This third quarter of a three quarter sequence combines didactic instruction, interactive sessions and student presentations. Topics cover study design, ethics, data analysis and management techniques, and qualitative research will be presented. Focus: lectures (different from I or II). **Prerequisites:** Joint Doctoral Program in Public Health graduate student, School of Medicine student, FPM 258B.

**FPM 259A Applied Epidemiology—Scientific Analysis (4):** Students will explore an epidemiologic research question by reviewing relevant published literature, and then design and conduct appropriate data analysis using a pre-existing dataset. May be taken for credit two times. **Prerequisites:** Joint Doctoral Program in Public Health graduate students.

**FPM 259B Applied Epidemiology—Scientific Writing (4):** Students will learn the principles of scientific writing, review examples of scientific literature, and then complete a manuscript suitable for publication based on their project from FPM 259A. May be taken for credit two times. **Prerequisites:** Joint Doctoral Program in Public Health graduate student, FPM 259A.

**FPM 259C Applied Epidemiology—Scientific Presentations (4):** Students will learn the principles of scientific presentations, for the classroom, and for scientific meetings (both oral and poster presentations). Students will then prepare and deliver presentations based on their project from FPM 259A. May be taken for credit two times. **Prerequisites:** Joint Doctoral Program in Public Health graduate student, FPM 259B.

**FPM 270 Cultural Perceptions of Health and Disease (4):** To improve knowledge about health and illness within cultural contexts, including review and discussions of epidemiologic studies describing health indicators/beliefs/practices. Students interact with experts in cross-cultural health research to
explore ethnicity/culture in health care delivery and utilization, and disease risk. **Prerequisites**: medical or graduate student. Other students admitted with consent of instructor.

**FPM 276 Health Behavior Interventions I (4)**: Course will include a discussion of intervention goals suggested by major theories of health behavior change. Common communication modes and messages will be studied, including examples using small group settings, mass media, legislation, and telephone counseling. **Prerequisites**: must be enrolled in the SDSU/UCSD Joint Doctoral Program in Public Health.

**FPM 277 Health Behavior Interventions II (4)**: This course focuses on critical analyses of success and failure of behavior theories as applied to interventions in multiple fields (e.g. smoking, dietary behavior, and physical activity). It covers individual and population approaches to behavior change. **Prerequisites**: must be enrolled in the UCSD/SDSU Joint Doctoral Program in Public Health (PU 75 and PU 76).

**FPM 278 Scale Development for Behavioral Health Measurement (4)**: Course will present theory and methods for developing scales to assess health behavior constructs (e.g., self-efficacy, social support). **Prerequisites**: must be enrolled in the SDSU/UCSD Joint Doctoral Program in Public Health. Graduate level statistics or research methods class.

**FPM 280A Practicum in Health Behavior I (4)**: Students will learn about grant writing, project management, and preparation of manuscripts for publication and presentations for scientific meetings, and also work individually with a faculty mentor to learn how to conduct a health behavior intervention. S/U grades only. **Prerequisites**: must be enrolled in the SDSU/UCSD Joint Doctoral Program in Public Health (PU75 and PU76). Courses must be completed in sequence.

**FPM 280B Practicum in Health Behavior II (4)**: Students will learn about grant writing, project management, and preparation of manuscripts for publication and presentations for scientific meetings, and also work individually with a faculty mentor in preparing manuscripts using data from a specific health behavior intervention. S/U grades only. **Prerequisites**: must be enrolled in the SDSU/UCSD Joint Doctoral Program in Public Health (PU75 and PU76). Courses must be completed in sequence (e.g., A before B and B before C).

**FPM 280C Practicum in Health Behavior III (4)**: Students will learn about grant writing, project management, and preparation of manuscripts for publication and presentations for scientific meetings, and also work individually with a faculty mentor in analyzing existing data sets. S/U grades only. **Prerequisites**: must be enrolled in the SDSU/UCSD Joint Doctoral Program in Public Health (PU75 and PU76). Courses must be completed in sequence (e.g., A before B and B before C).

**FPM 285 Clinical Trials: Issues and Dilemmas in Clinical Trials (2)**: This course provides a methodological perspective on clinical trials. Topics will include ethics, design of Phase I–IV trials, randomization/blinding, bias and sample-size power. Lectures will also cover “application” with eminent UCSD trialists describing conduct, design and statistical issues of specific studies. S/U grades only. **Prerequisites**: medical or graduate student standing.

**FPM 288 Introduction to Qualitative Research Methods (4)**: Focus on qualitative methods addressing both theoretical and practical dimensions of conducting qualitative research. Identify research questions for which qualitative methods are appropriate, and to critique qualitative research in terms of design, interview techniques, analysis, and interpretation.

**FPM 290 Health Policy and Health Behaviors in the United States (3)**: This course summarizes characteristics of the US health-care system and how it motivates health behaviors that negatively or positively affect outcomes. Also addressed are contemporary health policy issues related to health
behaviors (e.g. smoking, dietary behavior, and physical activity). **Prerequisites:** must be enrolled in the UCSD/SDSU Joint Doctoral Program in Public Health (PU75, PU76 and PU77) or consent of the instructor.

**FPM 291 Dissemination and Implementation Science in Health: An Introduction (4):** Focus on disseminating and scaling up health interventions in real-world settings. Interactive didactic sessions and guest lectures on implementation of research principles, approaches, and methods. Will design a proposal to implement or scale-up a clinical or public health intervention.

**MED 231 Mixed Methods (4):** This course will provide an overview of mixed methods research, with an emphasis on its application in public health research. Specific examples will be drawn largely from the fields of substance use and HIV research. The course will begin with a discussion of the history and philosophy of mixed methods research, and will maintain a focus on the epistemological underpinnings of both mixed methods designs and their component parts. Consideration will be given to a number of research traditions that can be subsumed under the general headings of “quantitative” and “qualitative” methods, including epidemiological surveys, in-depth qualitative interviewing, ethnography, social network analysis, and Geographic Information Systems (GIS). Methods for collecting, analyzing, integrating, and reporting data from multiple sources will be discussed. The course will have an applied focus and will include lectures, presentations of applied mixed methods research by guest experts, applied and methodological readings, and student presentations.

**JDP PH Core Requirements (SDSU)**

**PH 601 Epidemiology (3):** Distribution and determinants of diseases; role of epidemiology in public health. Descriptive, analytic and experimental epidemiology.

**PH 602 Biostatistics (3):** Statistical reasoning applied to public health; probability, hypothesis testing, regression and correlation, analysis of variance, measurement theory and modeling. **Prerequisite:** Consent of instructor.

**PH 603 Behavioral and Social Science in Public Health (3):** Role of psychological, social and environmental variables in health and illness. Multifactorial psychosocial model of disease susceptibility. **Prerequisites:** Psychology 316, 340, and Sociology 436

**PH 627 Advanced Statistical Methods in Public Health (3):** Applications of advanced statistical methods for analysis of public health and biomedical data. Topics include multiple linear regression, analysis of variance, logistic regression, and introduction to survival analysis. **Prerequisite:** Public Health 602

**PH 628 Multivariate Statistics (3):** Statistical methods for multivariate problems in public health including regression diagnostics, cluster analysis, discriminant analysis, principal components, multivariate discrete analysis and Poisson regression. Computer applications included. **Prerequisite:** Public Health 627

**PH 649 Border and Global Health Surveillance (3):** Data sources for border and global surveillance, including hospital system syndromic data. Methods of data quality control, data analysis, and alerting and communication of information. **Prerequisites:** Public Health 601 and 602

**PH 682 GIS/Public Health Spatial Analysis (3):** Theoretical concepts of geographic information systems (GIS) and applications of GIS in public health. ArcGIS 9 software to illustrate the capabilities
and uses of GIS in both academic research and regulatory decision making. **Prerequisites:** Public Health 601 and 602

**PH 700A Maternal and Child Health (3):** Investigation of current problems in one of the fields of public health. May be repeated with new content. See Class Schedule for specific content. Maximum credit nine units of Public Health 700 applicable to a master’s degree. These units may be in a single concentration area or any of the public health concentration areas. **Prerequisites:** Public Health 601, 602, and 603

**PH 700A Migration and Global Health (3):** Investigation of current problems in one of the fields of public health. May be repeated with new content. See Class Schedule for specific content. Maximum credit nine units of Public Health 700 applicable to a master’s degree. These units may be in a single concentration area or any of the public health concentration areas. **Prerequisites:** Public Health 601, 602, and 603

**PH 780 Global Health I (3):** Principles of global health. Challenges of urbanization and migration to include demography; main causes of morbidity and mortality, including infectious agents; reproductive health; cultural diversity; and global preparedness. **Prerequisites:** Public Health 601 and 602

**PH 780 Global Health II (3):** Global health to include trends and impacts of chronic physical and mental disease; infectious diseases of global importance; nutritional status and disease patterns; resource constrained environments, and design of international health organizations and systems. **Prerequisite:** Public Health 780

**PH 800 Professional Seminar in Public Health (1-9):** Investigation of a particular topic or issue, emphasis on empirical research; topic to be announced in the Class Schedule. Maximum credit nine units applicable to a doctoral degree. **Prerequisite:** Admission to the doctoral program.

**PH 800 Global Health (1-9):** Investigation of a particular topic or issue, emphasis on empirical research; topic to be announced in the Class Schedule. Maximum credit nine units applicable to a doctoral degree. **Prerequisite:** Admission to the doctoral program.

**PH 850 Global Health Practicum (3):** An international research activity, program evaluation, participation in a multinational organization internship, or field work with government or non-governmental organizations. This practicum is required for completion of the Ph.D. in global health under supervision of program directors. **Prerequisites:** Public Health 781, 800, 880

**PH 880 Program Planning and Evaluation in International Settings (3):** Theory and skills to evaluate research and service programs in international settings to include methods in program planning and evaluation, distinctions between research and evaluation, special considerations in cross-cultural settings, and transadaptation of planning and evaluation materials. **Prerequisite:** Public Health 780

**Joint Doctoral Program in Interdisciplinary Research on Substance Abuse (UC San Diego/San Diego State University)**

**Program Description**

The PhD degree in Interdisciplinary Research on Substance (IRSU) is awarded jointly by UCSD and SDSU. This is a social science research program designed to train researchers to conduct cutting-edge investigation to reduce the national and global burden of substance use and misuse.
The curriculum was designed to prepare the next generation of leaders in substance use research with the knowledge and skills to advance evidence-based and applied substance use interventions, programs and policies. The program has a decidedly global health flavor.

National and global research and policy needs amidst climate of ongoing concern over the impact of substance use disorders and addiction will afford JDP IRSU Program graduates with ongoing job opportunities to offer a highly needed specialization in substance use research. The program builds on mutual and complementary strengths of faculty in both institutions and will be the most productive doctoral programs in the nation associated with a School of Social Work.

**Program Requirements**

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<thead>
<tr>
<th>SDSU (24 UNITS) – YEAR 1</th>
<th>UCSD (36 UNITS) – YEAR 2</th>
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<tbody>
<tr>
<td><strong>Course Number</strong></td>
<td><strong>Course Title</strong></td>
</tr>
<tr>
<td>SW 801</td>
<td>Global Approaches to Substance Use Prevention and Treatment</td>
</tr>
<tr>
<td>SW 801</td>
<td>Advanced Seminar in Substance Use Research</td>
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<tr>
<td>SW 880</td>
<td>Advanced Seminar in Substance Use Research</td>
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<tr>
<td>PH 800</td>
<td>JDP Seminar</td>
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<td><strong>UCSD (36 UNITS) – YEAR 2</strong></td>
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<tr>
<td>SW 850</td>
<td>Theoretical Approaches to Substance Use</td>
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<tr>
<td>SW 881</td>
<td>Advanced Multivariate Data Analysis: Applications to Substance Use Research</td>
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<tr>
<td>SW 702</td>
<td>U.S.-Mexico Border Health, Emphasis on Substance Use</td>
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<tr>
<td>SW 897</td>
<td>Independent/Dissertation Research</td>
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<tr>
<td>SW 899</td>
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**RESEARCH – YEAR 3**

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<th>Dissertation Work</th>
<th>Dissertation Defense</th>
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**Current List of JDP IRSA Degree Courses**

**JDP IRSA Core Requirements**

**SW 702 U.S.-Mexico Border Health, Emphasis on Substance Use (3):** The seminar advances understanding of policies and research related to health and substance use in the U.S.-Mexico border region and among migrant populations. Students explore intersection of substance use research, policy & substance use risk.

**SW 800 Etiology and Pharmacology of Substance Use (3):** This seminar is designed to provide fundamental and advanced knowledge about the pharmacology and underlying causes of addiction in the most impactful substances of use and misuse in the U.S. Topics include: opioids and prescription drugs,
marijuana, and cocaine among other substances. This class also aims to introduce the students to current research issues related to substance use and treatment of addiction.

**PH 800 JDP Seminar (2):** Research and professional development seminar with Public Health Students

**SW 801 Global Approaches to Substance Use Prevention and Treatment (3):** Using a global health perspective, this course is designed to provide students with an advanced technical understanding of the etiology, epidemiology and prevention and treatment of substance and related problems. The course is comprised of three units reflecting the topical foci and will include: Lectures, discussions, student presentation and field trip to a local research & treatment program in Tijuana, Baja California, Mexico.

**SW 850 Theoretical Approaches to Substance Use (3):** This broadly focused course will provide students with an overview of current social and behavioral science theories used to understand health-related behavior as well as how these theories can be used to guide the development of behavior change interventions designed to reduce negative health behaviors. We will take an ecological focus for this course and will focus on the application of health behavior theory at multiple levels. Particular emphasis will be given to discussing health-related disparities and whether current theory is adequate to explain health behavior in light of the disparities in the U.S.

**SW 880 Advanced Seminar in Substance Use Research (3):** The purpose of this course is to prepare students to conduct research with focus on substance use topics. This course is designed to introduce students to the process of research as a sequence of events & characterize different approaches to experimental and non-experimental substance use research. Students will learn how to evaluate strengths and weaknesses of various research designs and methods, understand measurement issues, including those related to reliability and validity.

**SW 881 Advanced Multivariate Data Analysis: Applications to Substance Use Research (3):** This seminar course provides a conceptual overview of advanced multivariate statistical analysis techniques used frequently in substance use/use research as well as application practice. Each week students will learn about a particular data analysis technique and will be asked to analyze data using the technique. Students will read empirical articles in substance use literature which use the multivariate technique discussed during each course session.

**SW 897 Independent/Dissertation Research (3-6):** Independent Research (pre-Candidacy) or Dissertation Research (Advanced Candidacy Status); can be taken 6 units maximum per semester.

**SW 899 Dissertation Defense**

**Integrated Fellowship in Cardiovascular Disease Epidemiology**

**Program Description**

This NHLBI-funded T32 focuses on Cardiovascular Disease Epidemiology and is closely affiliated with our JDP with San Diego State University. Trainee selection is based on interest in cardiovascular disease prevention, potential for an academic research career, and demonstrated excellence. Predoctoral trainees are eligible for applying to the UCSD-SDSU Joint Doctoral Program in Public Health and preference will be given to those with a Master’s degree. Postdoctoral trainees will hold either the MD, DrPH, or PhD degree. Physician trainees will generally enter after completion of clinical training in medicine, psychiatry, pediatrics, or preventive medicine. The curriculum will center on an intensive multidisciplinary research project and will include appropriate didactic coursework depending on the
extent of previous training by the fellow. The standard program length of two years may be extended to three years for post-doctoral and five years for pre-doctoral fellows.

Program Requirements

All fellows participate in the following and must report which they have attended on a quarterly basis:

- Public Health Grand Rounds, which typically occurs once every three months
- Monthly journal club and seminar on cardiovascular disease epidemiology and prevention, which typically occurs on the first Friday of the month from 12-2pm
- Clinical Epidemiology and Prevention Seminar, FMPH 247, 8 sessions, 2 hr. each, given in the Spring Quarter
- Selected other Grand Rounds (Cardiology, Endocrine, Medical)
- Selected other scholarly activities
- UCSD Department of Family Medicine and Public Health Calendar

All fellows complete the following:

- Independent research project
- CITI online training: https://www.citiprogram.org/
- Scientific Ethics or Ethics in Scientific Research class
  - **SOMI 226 Scientific Ethics (1):** Overview of ethical issues in scientific research, conflicts of interest; national, statewide and campus issues and requirement; ethical issues in publications; authorship; retention of research records; tracing of research records; attribution; plagiarism; copyright considerations; primary, archival and meeting summary publications; ethical procedures and policies; NIH, NSF, California and UCSD; case studies and precedents in ethics. **Prerequisites:** consent of instructor.
  - **BMS 219 Ethics in Scientific Research (1):** Overview of ethical issues in scientific research, conflicts of interest; national, statewide and campus issues and requirement; ethical issues in publications; authorship; retention of research records; tracing of research records; attribution; plagiarism; copyright considerations; primary, archival and meeting summary publications; ethical procedures and policies; NIH, NSF, California and UCSD; case studies and precedents in ethics. **Prerequisites:** consent of instructor.

All post-doctoral fellows are expected to achieve the following:

- Pursue didactic training in epidemiology and earn either a Master’s degree or certificate for didactic training in epidemiology. This requirement is waived for those with prior degrees in epidemiology or comparable training.
- Collaborate with a mentor on ongoing research; develop and conduct an independent research.
- Manage their own dataset or data from an existing project.
- Conduct a statistical analysis of original data or a secondary analysis of existing data.
- Develop, write and submit two abstracts for presentation at national scientific meetings.
- Develop, write and submit three manuscripts for publication in peer-reviewed literature
- Critique 4 published peer reviewed articles.
- Present the results of their research annually to the Executive and Advisory Committees.
- Develop, write and submit a grant proposal for extramural support.
- Present at the UCSD Public Health Research Day.
- Attend the UCSD Institute for Public Health quarterly scientific presentation series.
All pre-doctoral fellows are expected to achieve the following:

Knowledge:
- To appreciate the scope of disease burden encumbered by CVD.
- To understand the multifactorial risks associated with the development of CVD.
- To learn the different modalities for measuring the degree of risk for CVD.
- To appreciate the different population and individual approaches to the prevention of CVD.
- To know the fundamental techniques in epidemiology, biostatistics, and prevention for investigation of public health problems related to CVD.

Skills:
- To be able to conduct systematic literature reviews using electronic media.
- To become competent in critiquing the published peer reviewed literature.
- To be well versed at constructing hypotheses and then identifying, developing and formulating the appropriate research study design.
- To be capable of assembling and organizing research data.
- To be skilled at conducting statistical analyses within the context of specific research aims.
- To cultivate a research project that is independent of the mentor’s.
- To develop and prepare scientific manuscripts and prepare a grant application.
- To learn the behavioral and management skills requisite for collaboration and conducting multidisciplinary research.

Attitudes and Behavior:
- To become dedicated to epidemiologic research focused on the prevention of CVD.
- To consider and pursue collaborations that foster multidisciplinary research.
- To recognize the importance of evidence-based research for preventing CVD.
- To strive for incremental levels of career independence.
- To participate in academic and social events that provide exposure to the roles, values and ethical standards of investigators.
Joint Preventive Medicine Residency Program (UC San Diego/San Diego State University)

Program Description

Founded in 1983, the UCSD-SDSU General Preventive Medicine Residency trains physicians in preventive medicine and public health. It is co-sponsored by the Department of Family and Preventive Medicine at the UCSD and the Graduate School of Public Health at SDSU. The residency provides training for Post Graduate Years 2 and 3 (PGY-2 and PGY-3). Applicants must have completed at least one full year of acceptable clinical training/direct patient care (PGY1 internship) and completed Step III of the USMLE by the time of entry.

The residency has been fully accredited by the American College of Graduate Medical Education (ACGME) since its inception. We offer training in two of the three “years” required for Board eligibility. The didactic and exponential rotations year are obtained concurrently.

The rotations, at the University of California, San Diego and in the community provides training on competencies to deal with clinical preventive medicine and population-level problems such as health care for the indigent, bioterrorism prevention and response, communicable disease control, and health care delivery. Clinical and population-based training takes place mainly in the community, at community health centers, public health departments, and community research facilities. Residents concurrently obtain a Master’s in Public Health degree at San Diego State University during their training; the MPH degree or its equivalent is required for Board certification in this specialty.

The joint sponsorship of this program results in a training environment with access to both academic and clinical medicine through the UCSD School of Medicine, and academic public health resources through the SDSU Graduate School of Public Health. Residents are SDSU graduate students throughout their residency, and as UCSD housestaff, they benefit appropriately from UCSD School’s high quality systems for graduate medical education.

Program Requirements

Didactics

The didactic component includes: coursework towards the Masters in Public Health (MPH); weekly seminars; weekly journal club; Board preparation sessions; grand rounds; local seminars in our department and others; and local and national conferences. The program requires completion of the MPH with concentration in: a) Epidemiology, b) Health Promotion, c) Environmental Health, or d) Health Services Administration.

The weekly didactics include clinical preventive medicine, occupational medicine, community health, research design, health economics, health policy, health law, and other core subjects. Weekly journal clubs enhance these didactic sessions, and residents are encouraged to choose topics useful for Board preparation. Additional didactics are offered at both SDSU and UCSD School, including CME at SDSU.
Student Health Services, and epidemiology and toxicology grand rounds, and clinical grand rounds in each residency specialty, at UCSD School.

Residents attend regional and national meetings such as the ACPM Preventive Medicine annual conference, the San Diego Epidemiology Exchange, the CDC Chronic Disease Conference, and others pertinent to their interests.

Rotations

The practicum rotations train all residents in the following three areas.

1. **Clinical Preventive Medicine:** The majority of these rotations take place at clinical sites serving underserved populations, immigrants, and refugees. They include Federal 330 HRSA-funded community health centers (CHCs), a refugee screening clinic, and student health centers in both the community colleges and in the three main local universities. One of our aims is to develop the skills of residents to work in medically-underserved settings in order to help address the maldistribution of physicians in the U.S. Other clinical sites enhance the specific training needs of residents in each track (see below) and include the refugee health assessment clinic, student health centers, STD, tuberculosis and travel clinics, cardiovascular clinics, and others.

2. **Population-Based Medicine:** All residents rotate in the San Diego County Public Health Department. This experience supports core competencies in public health, with residents gaining knowledge and experience of the full range of services provided in public health settings. This experience includes a one-week introduction to all public health services, followed by resident-specific rotations in units addressing communicable disease, STDs, TB, border health and refugee services, and others. Other population-based rotations include activities such as surveillance, population-based interventions, outbreak investigation, contact investigation, grant proposal writing, needs assessment, program planning, community interventions and quality improvement.

3. **Research:** All residents engage in research that culminates in writing a manuscript of publishable quality in a peer-reviewed journal. This activity assists in the development of core preventive medicine competencies such as written and oral communication skills, computer skills, epidemiological and biostatistical skills required for data analysis, management of research resources, and, if appropriate, supervision of research assistants. While actual publication of the final paper is not required, residents present their research project to residency faculty and the Residency Advisory Committee, and their paper is reviewed and critiqued by a committee of residency faculty.

Track Rotations

In addition to the required components above, the program recognizes the breadth of career opportunities in preventive medicine and the specific skills and competencies required for each career path. Therefore, we encourage residents to concentrate their practicum rotation efforts in one of the following four tracks, each of which has specific learning objectives and enhances the skills of residents beyond the basic training described above.

1. **Community-Oriented Preventive Medicine (COPM):** This track provides extensive training of residents in medically-underserved communities, including community health centers (CHCs), Indian Health Services, homeless shelters, and public health agency centers. Skills are developed in a combination of quality assurance, health care administration, community outreach, needs assessment, and research; and residents are encouraged to maintain – and even strengthen – their
skills in patient care. Dr. Hill, who has worked in the CHCs since 1980, coordinates resident placement in this track. Residents are supervised by preceptors whose duties are specified in memoranda of understanding (MOUs) between the residency program and the host entity. Residents in this track often assume employment in these settings upon graduation, and our experience is that many graduates become CHC medical directors.

2. **Border and International Health Track:** This track trains residents in health issues related to immigration, migration and refugee status, as well as in the public health and policy issues of border and international health care. Residents develop clinical skills in infectious and chronic disease, mental health, screening, family planning, and health promotion for these populations. Public health and policy training provides skills in outreach, surveillance, research, community needs assessments, epidemiology, and public outreach. Training sites include a refugee health clinic, public health clinics, international rotations, CHCs, international research experiences, travel clinics, and others.

3. **Public Health Track:** This track emphasizes training in the local public health department. Because of the safety-net role the San Diego County Public Health Department plays in providing services to the underserved, this rotation helps us meet our goal of training physicians to support underserved populations. Clinical services are provided for tuberculosis and sexually transmitted diseases. Other areas of emphasis include community health promotion programs, border health programs, communicable diseases, and epidemiology. Track graduates are poised to assume roles in public health facilities. For example, the current Chief Public Health Officer, Tuberculosis Control Officer, and Refugee Health Officer are all graduates. Other alumni are in state and federal positions, including the NIH, FDA and CDC/EIS.

4. **Academic and Research-Related Preventive Medicine:** This track focuses on developing and enhancing the research and evaluation skills of residents who are interested in full-time careers in academic preventive medicine or as researchers in private or public settings. In addition to the required research, residents in this track participate in more extensive research projects with mentors at UCSD or SDSU where internationally-known experts in fields such as epidemiology, health behavior, infectious disease, and health outcomes research have labs. Residents in this track also have increased opportunities to build skills in teaching and mentoring those more junior to themselves. A specialization on the academic track is the Cancer Prevention and Control Research and Practice track. This is the track for residents with a specific interest in cancer-related preventive medicine. Residents in this track receive support from the American Cancer Society. This track provides residents with the skills needed for cancer prevention and control activities in both research and applied settings. Residents in these training activities often continue in academic or research settings.

**Student Run Free Clinic**

**Program Description**

Within the School of Medicine, the Student Run Free Clinic is a great opportunity for developing student leadership and for working with poor and socioeconomically disadvantaged students. There are many faculty in the SOM who donate their effort to support this program. In addition to directly meeting the ongoing healthcare needs of 2,000 plus patients a year, at minimal cost, the SRFC Project creates a unique and invaluable learning opportunity for medical, pharmaceutical, dental and integrative medicine students. The SRFC Project is nationally recognized and serves as a model and a training ground for medical leaders countrywide who are seeking to better meet the needs of underserved and vulnerable
populations. We anticipate creating opportunities for SPH students to participate in this clinic as dental, pharmacy, and other discipline students.

**Current List of SRFC Courses**

**FPM 272 Community Advocacy (4):** The UCSD Student-Run Free Clinic Project operates in partnership with two community programs for the homeless and an inner-city elementary school. Students participate in didactic sessions learning principles of working with the underserved and are supervised in clinical, health education, and administrative roles at the clinic sites. S/U grades only. **Prerequisites:** medical student.

**FPM 286 Community Advocacy II (2 or 4):** The Free Clinic Project operates at three community-based sites. In this class, students, under faculty supervision, provide clinical services and learn administrative, health education and leadership. S/U grades only. May be taken for credit as many times as desired. **Prerequisites:** FPM 272.

**FPM 432 4th Year Clerkship (2):** Students are supervised in direct patient care in a rural or urban underserved primary care setting under the supervision of a member of the Family medicine academic or community faculty. Students also participate in didactic sessions on the care of the underserved.

**Programs in Healthy Aging**

**The Jackuelyn Harris High School Student Training in Aging Research (HS STAR):** This program is designed to provide exceptional under represented junior and senior level high school students from San Diego (mostly from the Preuss School) with a chance to learn and practice the daily activities involved in aging research alongside a UCSD faculty mentor. This is a five-week internship in which students learn under the mentorship of a researcher in the field of aging at UCSD and participate in group activities, lectures, and tours exposing them to the vast field of aging research. The long-term goal of the program is to encourage students to consider careers in the field of aging research. This program has been funded continuously for 12 years, with help from the Stein Institute for Research on Aging, the Jackuelyn Harris Fund, and the Edna Merryman Fund.

**Life Course Scholars Program:** The Life Course Scholars program combines place-based, experiential, and traditional classroom-based learning methods, one-on-one matching with elders living in the community, and learning exchange groups to promote participatory planning and collaborative research activities. This is an interdisciplinary, cross-generational, multi-site learning experience for UCSD undergraduates that transformed their understanding of aging, health, learning & research, and connected them more deeply to the “people and places” of surrounding San Diego communities. The program culminated in LCS teams designing and implementing community-based Healthy Aging Projects under the guidance and mentorship of an interdisciplinary team of faculty collaborators, with support from interested Elder Partners. It consists of two 4-unit seminar courses related to aging, health, society, and the physical and social environment.

**The Design Competition to Improve the Quality-of-Life for Seniors:** A year-long design competition open to UCSD undergraduates who form teams with at least one member from the ECE Department. Through a series of workshops and one-to-one feedback sessions, the students gain knowledge on aging, the importance of human-centric design, and an understanding of the product business cycle. Students work collaboratively with older adults living in the La Costa Glen Retirement Community.

**Medical Student Training in Aging Research (MSTAR) 5-T35-AG026757:** MSTAR is a NIA-funded research training program that each year provides up to 18 medical students from across the nation an
opportunity to conduct 2 to 3 months of summer research guided by the mentorship of a UCSD faculty member. Students receive fulltime training conducting hands-on research in an area of personal interest pertaining to aging or an age-related disorder. Additionally, students participate in a variety of clinical activities and didactics that help shape their knowledge base related to aging and teach valuable skills needed to conduct research. Students are provided an opportunity to showcase their work locally and are encouraged to travel to the Annual Meeting of the American Geriatrics Society to present their findings. The MSTAR program has been funded by the National Institute on Aging since 2005 and was most recently renewed with a perfect priority score.

**Postdoctoral students, Postdoctoral T32 Fellowship funded by the NIMH:** Fellowships are a critical element of the Stein Institute for Research on Aging's mission to develop and apply the latest advances in biomedical and behavioral science to issues of healthy aging and to prevent and reduce the burden of disability and disease in late life. This training program facilitates the development of a diverse and highly trained workforce that will ultimately assume leadership roles related to the nation's biomedical and behavioral research agenda. More specifically, the program trains researchers with expertise in geriatric mental health to help meet the needs of our rapidly aging society. The program has been funded continuously since 1994.

**Sustained Training on Aging & HIV Research (STAHR):** STAHR is a NIMH-funded, collaborative state-of-the-art research training program that aims to be at the forefront of mental health research in HIV and Aging. As people with HIV are living into older age, they are experiencing multiple interacting causes of morbidity. This program fosters the development of researchers with knowledge and expertise in both aging and HIV and is intended to transform promising junior scientists into high-quality independently-funded researchers who will make lasting contributions to HIV and aging mental health research. The program has been developed for clinical and translational post-doctoral fellows and junior faculty from across the country, with previous training in either aging or HIV research, but interest in gaining expertise in the intersection of these two factors.

**Stein Institute for Research on Aging Monthly Public Lecture Series:** This popular, longstanding public lecture series includes 10 public lectures per year and approximately 150 attendees per lecture. The series is broadcast on UCTV, YouTube, and iTunes and has had over 18 million hits from all over the world during the last year.

**UCSD Center for Healthy Aging Symposia:** Thus far, two annual symposia on Healthy Aging, featuring nationally renowned experts in the fields of senior living, healthcare, and age-friendly communities have been held for University faculty, staff, and students, along with industry professionals, and the general public. These events have drawn crowds of over 400 each year.

**UCSD Center for Healthy Aging Monthly Grand Rounds:** This series, intended for faculty, researchers, health care providers, and students, offers opportunities to discuss relevant topics with guest lecturers in the field of aging and successful aging. Current General Campus Public Health Degree Programs
APPENDIX C-III: CURRENT GENERAL CAMPUS PUBLIC HEALTH RELATED DEGREE PROGRAMS AND CURRICULAR OFFERINGS

Bachelor of Arts in Global Health

Program Description

Undergraduate degrees in the Global Health Program provide students with an in-depth understanding of factors related to illness, health, and healing from a comparative and interdisciplinary perspective that transcends national borders and regional interests and takes cultural difference and diversity fully into account.

The program’s degrees are designed to be intellectually comprehensive, integrating the social sciences, biological sciences, and humanities. They combine academic and experiential learning, striking a balance between acquisition of hard skills, critical thinking, and real world knowledge.

Degree Requirements

<table>
<thead>
<tr>
<th>REQUIRED CORE COURSES (12 UNITS)</th>
<th>Course Number</th>
<th>Course Title</th>
<th># of Units</th>
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<tr>
<td>One of: HILD 30, GLBH 20, FMPH 40; One of: SOCI 30, SOCI 40, SOCI 70, PHIL 26, &amp; One of: PSYC 60, POLI 30 OR 30D, MATH 11/11L, COGS 14B</td>
<td>Lower Division</td>
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<tr>
<td>GLBH 148</td>
<td>Global Health and Cultural Diversity</td>
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<td>GLBH 181</td>
<td>Essentials of Global Health</td>
<td>4</td>
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<tr>
<td>MGT 173</td>
<td>Project Management in Health Sciences</td>
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<td>GLBH 160, POLI 160A, POLI 170A, USP 171, SOCI 152 / USP 133, ECON 130, HISC 180, ENVR 110</td>
<td>Policy Analysis Course (One)</td>
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<tr>
<td>GLBH 150A</td>
<td>Science and Public Health</td>
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<td>GLBH 150B</td>
<td>Environmental Law</td>
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<td>ELECTIVES (32 UNITS)</td>
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<td>Biological Science</td>
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<td>CGS 111, GLBH 129, HISC 115, 116, 108, 109, LTCS 155, 156, LTWL 177, PHIL 150, 163, 164, 173</td>
<td>Medical Humanities</td>
<td>4</td>
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GLOBAL HEALTH FIELD EXPERIENCE (100 HOURS)

Current List of BAGH Degree Courses
BAGH Core Requirements

**COGS 14B Introduction to Statistical Analysis (4):** Introduction to descriptive and inferential statistics. Tables, graphs, measures of central tendency and variability. Distributions, Z-scores, correlation, regression. Probability, sampling, logic of inferential statistics, hypothesis testing, decision theory. T-test, one and two-way Anova, nonparametric tests (Chi-square). Prerequisites: Cognitive Science 14A.

**ECON 130 Public Policy (4):** Course uses basic microeconomic tools to discuss a wide variety of public issues, including the war on drugs, global warming, natural resources, health care and safety regulation. Appropriate for majors who have not completed Econ 100A-B-C and students from other departments. Prerequisites: Econ 2 or 100A.

**ENVR 110 Environmental Law (4):** Explores environmental policy in the United States and the ways in which it is reflected in law. The social and political issues addressed include environmental justice and environmental racism, as well as the role of government in implementing environmental law. Prerequisites: upper-division standing or consent of instructor.

**FMPH 40 Introduction to Public Health (4):** This course provides an introduction to the infrastructure of public health; the analytical tools employed by public health practitioners; bio-psychosocial perspectives of public health problems; health promotion/disease prevention; quality assessment in public health; and legal and ethical concerns.

**GLBH 20 Introduction to Global Health (4):** Provides a foundational interdisciplinary understanding of complex global health issues and introduces major concepts and principles in global health. The course surveys the range of problems contributing to the global burden of disease and disability including infectious disease, mental illness, refugee and immigrant health, natural disasters, climate change, and food insecurity.

**GLBH 148 Global Health and Cultural Diversity (4):** Cross-listed with ANSC 148. Introduction to global health from the perspective of medical anthropology on disease and illness, cultural conceptions of health, doctor-patient interaction, illness experience, medical science and technology, mental health, infectious disease, and health-care inequalities by ethnicity, gender, and socioeconomic status.

**GLBH 150A Global Health Capstone Seminar I (4):** Course will consist of intensive reading and discussion in fields related to each student’s primary interest and building on their Global Health Field Experience. The course is oriented toward producing a senior thesis that serves as credential for students applying for postgraduate or professional training. Prerequisites: departmental approval required.

**GLBH 150B Global Health Capstone Seminar II (4):** Course will be a workshop with critical input from all participants focused on preparing a senior thesis. The course is oriented toward producing a senior thesis that serves as credential for students applying for postgraduate or professional training. Prerequisites: GLBH 150A; departmental approval required.

**GLBH 160 Global Health Policy (4):** Students will learn fundamental principles and concepts of global health policy, law, and governance. The course will focus on identifying critical global health policy challenges and solving them using a multidisciplinary approach that takes into account the perspectives of various stakeholders. Prerequisites: upper-division standing.

**GLBH 181 Essentials of Global Health (4):** This course will provide an overview of global health as a field of research and practice, with an emphasis on use of surveillance methods to understand health and determinants of health, evidence-based program development and evaluation of programs in the field, and
engagement with governments and advocacy groups to elicit evidence-based policy change. Topics of focus will prioritize infectious diseases, maternal child health, substance use and gender-based violence, as case examples of global health research and programmatic approaches. By the end of this course students should have acquired an understanding of the global burden of major diseases and population health concerns, how to understand and intervene upon the determinants of disease and other health concerns, and how to develop and implement monitoring and outcome evaluations for use in low resource settings.

HILD 30 History of Public Health (4): Explores the history of public health, from the plague hospitals of Renaissance Italy to the current and future prospects for global health initiatives, emphasizing the complex biological, cultural, and social dimensions of health, sickness, and medicine across time and space.

HISC 180 Science and Public Policy (4): This course will explore the evolution of the institutions, ideologies, procedures, standards, and expertise that modern democratic societies have used in applying science to generate and legitimate public policy.

MATH 11/11L Calculus-Based Introductory Probability and Statistic + Lab (4): Events and probabilities, conditional probability, Bayes’ formula. Discrete random variables: mean, variance; binomial, Poisson distributions. Continuous random variables: densities, mean, variance; normal, uniform, exponential distributions, central limit theorem. Sample statistics, confidence intervals, hypothesis testing, and regression. Applications. Intended for biology and social science majors. Prerequisites: AP Calculus BC score of 3, 4, or 5, or Math 10B or Math 20B, and concurrent enrollment in Math 11L.

MGT 173 Project Management in Health Services (4): This course covers efficient techniques for managing health services projects including both the technical aspects of project management as well as the human capital management issues associated with blending administrative and technical staff with healthcare professionals. Topics include: scheduling methods, milestone setting, governmental regulations, resource allocation, interpersonal skills, and performing research and development projects - all with a health services focus.

PHIL 26 Science, Society, and Values (4): An exploration of the interaction between scientific theory and practice on the one hand, and society and values on the other. Topics can include the relationship between science and religion, global climate change, DNA, medicine, and ethics.

PSYCH 60 Introduction to Statistics (4): This course provides an introduction to both descriptive and inferential statistics, core tools in the process of scientific discovery and the interpretation of research. Recommended to complete during a student’s 2nd year.

POLI 30/30D Political Inquiry (4): Introduction to the logic of inference in social science and to quantitative analysis in political science and public policy including research design, data collection, data description and computer graphics, and the logic of statistical inference (including linear regression). Political Science 30 is Lecture only, and Political Science 30D is Lecture plus Discussion section. These courses are equivalents of each other in regards to major requirements, and students may not receive credit for both 30 and 30D.

POLI 160AA Introduction to Policy Analysis (4): Same as USP 101. This course will explore the process by which the preferences of individuals are converted into public policy. Also included will be an examination of the complexity of policy problems, methods for designing better policies, and a review of tools used by analysts and policy makers. Prerequisites: Political Science 10 or 11
POLI 170A Introductory Statistics for Political Science and Public Policy (4): Introduction to the use of statistics in both political science and public policy concentrating on regression based approaches. Students undertake a series of small quantitative analyses and one project. Prerequisites: upper-division standing.

SOCI 30 Science, Technology, and Society (4): A series of case studies of the relations between society and modern science, technology, and medicine. Global warming, reproductive medicine, AIDS, and other topical cases prompt students to view science-society interactions as problematic and complex.

SOCI 40 Sociology of Health-Care Issues (4): Designed as a broad introduction to medicine as a social institution and its relationship to other institutions as well as its relation to society. It will make use of both micro and macro sociological work in this area and introduce students to sociological perspectives of contemporary health-care issues.

SOCI 70 General Sociology for Premedical Students (4): This introductory course is specifically designed for premedical students and will provide them with a broad introduction to sociological concepts and research, particularly as applied to medicine.

SOCI 152/USP 133 Social Inequality and Public Policy (4): Primary focus on understanding and analyzing poverty and public policy. Analysis of how current debates and public policy initiatives mesh with alternative social scientific explorations of poverty. Prerequisites: upper-division standing. Will not receive credit for SOCI 152 and SOCC 152.

USP 147 Case Studies in Health Care Programs/Poor and Underserved Populations (4): The purpose of this course is to identify the special health needs of low income and underserved populations and to review their status of care, factors influencing the incidence of disease and health problems, and political and legislative measures related to access and the provision of care. Selected current programs and policies that address the health care needs of selected underserved populations such as working poor, inner city populations, recent immigrants, and persons with severe disabling mental illnesses will be studied. Offered in alternate years. Prerequisite: upper-division standing or consent of instructor.

USP 171 Sustainable Development (4): Sustainable development is a concept invoked by an increasingly wide range of scholars, activists, and organizations dedicated to promoting environmentally sound approaches to economic development. This course critically examines the diverse, often contradictory, interests in sustainability. It provides a transdisciplinary overview of emergent theories and practices. Prerequisites: upper-division standing

Current List of BAGH Electives

Anthropology: Biological Anthropology

ANBI 132 Conservation and the Human Predicament (4): Interdisciplinary discussion of the human predicament, biodiversity crisis, and importance of biological conservation. Examines issues from biological, cultural, historical, economic, social, political, and ethical perspectives emphasizing new approaches and new techniques for safeguarding the future of humans and other biosphere inhabitants. Prerequisites: upper-division standing or consent of instructor.

ANBI 134 Human Evolutionary Genetics (4): This course explores how genetic data can be used to address core issues in human evolution. We will reconstruct population history and explore sources of
human genetic diversity, such as migration and selection, based on studies of modern and ancient DNA. Through critical evaluation of recent publications, we will discuss the molecular evidence for the origin of modern humans, race, reconstruction of key human migrations, interactions with the environment, and implications for disease. **Prerequisites:** upper-division standing.

ANBI 141 The Evolution of Human Diet (4): The genotype of our ancestors had no agriculture or animal domestication, or rudimentary technology. Our modern diet contributes to heart disease, cancers, and diabetes. This course will outline the natural diet of primates and compare it with early human diets. **Prerequisites:** upper-division standing.

**Anthropology**

ANSC 101 Aging: Culture and Health in Late Life Human Development (4): Examines aging as process of human development, from local and global perspectives. Focuses on the interrelationships of social, cultural, psychological, and health factors that shape the experience and well-being of aging populations. Students explore the challenges and wisdom of aging. **Prerequisites:** upper-division standing.

ANSC 105 Global Health and Inequality (4): Why is there variation of health outcomes across the world? We will discuss health and illness in context of culture and address concerns in cross-national health variations by comparing healthcare systems in developed, underdeveloped, and developing countries. Study the role of socioeconomic and political change in determining health outcomes and examine social health determinants in contemporary global health problems: multidrug resistance to antibiotics, gender violence, and human trafficking, etc. **Prerequisites:** ANTH 21 or ANTH 23.

ANSC 106 Global Health: Indigenous Medicines in Latin America (4): Drawing on medical anthropology ethnography, students will explore a variety of forms of healing among rural and urban indigenous communities. A particular focus on intercultural health will allow the students to analyze contemporary medical landscapes where patients encounter indigenous and Western medicine. Students will learn about the complexities of urban and rural indigenous healing settings and their sociopolitical significance in contexts of state biomedical interventions. **Prerequisites:** ANTH 21 or 23. Freshmen and sophomores cannot enroll without consent of the instructor.

ANSC 107 Psychological Anthropology (4): Interrelationships of aspects of individual personality and various aspects of sociocultural systems are considered. Relations of sociocultural contexts to motives, values, cognition, personal adjustment, stress and pathology, and qualities of personal experience are emphasized.

ANSC 124 Cultural Anthropology (4): This course introduces the concept of culture and the debates surrounding it. Cultural anthropology asks how people create meaning and order in society, how culture intersects with power, and how national and global forces impact local meanings and practices.

ANSC 125 Gender, Sexuality, and Society (4): How are gender and sexuality shaped by cultural ideologies, social institutions, and social change? We explore their connections to such dimensions of society as kinship and family, the state, religion, and popular culture. We also examine alternative genders/sexualities cross-culturally.

ANSC 140 Human Rights II (4): Contemporary Issues: Interdisciplinary discussion that outlines the structure and functioning of the contemporary human rights regime, and then delves into the relationship between selected human rights protections—against genocide, torture, enslavement, political persecution, etc.—and their violation, from the early Cold War to the present. **Prerequisites:** CAT1 or CAT2 or CAT3.
or CAT125 or DOC1 or DOC2 or DOC3 or HUM1 or HUM2 or HUM3 or HUM4 or HUM5 or MCWP40 or MCWP41 or MCWP50 or MCWP125 or MMW11 or MMW12 or MMW13 or MMW14 or MMW15 or MMW21 or MMW22 or WCWP10A or WCWP10B.

**ANSC 142 Anthropology of Latin America (4):** This course will examine the overarching legacies of colonialism, the persistence of indigenous peoples and cultures, the importance of class and land reform, the effects of neoliberalism, and citizens’ efforts to promote social change in contemporary democracies. **Prerequisites:** upper-division standing.

**ANSC 143 Mental Health as a Global Health Priority (4):** Why is mental health a global concern? This anthropological course reviews globalization, culture, and mental health. We examine issues of social suffering, stigma, and economic burden associated with mental illness, gender inequality, political violence, "global security," pharmaceutical and illegal drugs.

**ANSC 144 Immigrant and Refugee Health (4):** Examines physical and mental health sequelae of internal and transnational movement of individuals and populations due to warfare, political violence, natural disaster, religious persecution, poverty and struggle for economic survival, and social suffering of communities abandoned by migrants and refugees.

**ANSC 145A International Politics and Drugs (4):** This course examines the domestic and international aspects of the drug trade. It will investigate the drug issues from the perspectives of consumers, producers, traffickers, money launderers, and law enforcement. Course material covers the experience of the United States, Latin America, Turkey, Southeast Asia, Western Europe, and Japan.

**ANSC 146 A Global Health Perspective on HIV/AIDS (4):** An introductory course on HIV taught through a medical student format, with emphasis on research and experiential learning, including observation of physicians providing care for patients from diverse socioeconomic and cultural backgrounds, some of whom may be underinsured/uninsured, homeless, and/or immigrants.

**ANSC 147 Global Health and the Environment (4):** Examines interactions of culture, health, and environment. Rural and urban human ecologies, their energy foundations, sociocultural systems, and characteristic health and environmental problems are explored. The role of culture and human values in designing solutions will be investigated.

**ANSC 150 Culture and Mental Health (4):** This course reviews mental health cross-culturally and transnationally. Issues examined are cultural shaping of the interpretation, experience, symptoms, treatment, course, and recovery of mental illness. World Health Organization findings of better outcome in non-European and North American countries are explored.

**ANSC 154 Gender and Religion (4):** How and why is gender important to religious practices, doctrines, and ideologies? Focusing on modern Islam, Christianity, and Judaism, we will look at women's involvement in religious movements as well as religious debates over issues of gender, sexuality, and marriage.

**ANSC 155 Humanitarian Aid: What is it Good For? (4):** This course examines the intended and unintended consequences of humanitarian aid. How do organizations negotiate principles of equality with the reality of limited resources? What role does medicine play in aid efforts? In spaces where multiple vulnerabilities coexist, how do we decide whom we should help first? While the need for aid, charity, and giving in the face of suffering is often taken as a commonsensical
ANSC 156 Mad Films (4): This course examines historical and cultural dimensions of madness as depicted in iconic and popular films such as One Flew Over the Cuckoo’s Nest, Girl Interrupted, Silver Linings Playbook, along with ethnographic and artistic films that utilize anthropological approaches.

ANSC 160 Nature, Culture, and the Environment (4): Course examines theories concerning the relation of nature and culture. Particular attention is paid to explanations of differing ways cultures conceptualize nature. Along with examples from non-Western societies, the course examines the Western environmental ideas embedded in contemporary environmentalism.

ANSC 164 Anthropology of Medicine (4): Basic concepts and theory of medical anthropology are introduced and applied to comparison of medical systems including indigenous and biomedical, taking into account cross-cultural variation in causal explanation, diagnosis, perception, management, and treatment of illness and disease.

ANSC 168 The Human Condition (4): This course explores experiences of the human life cycle—birth, death, love, family relations, coming of age, suffering, the quest for identity, the need for meaning—from diverse cultural perspectives. Examines anthropological thought concerning what it means to be human.

ANSC 182 Gun Violence as Social Pathology (4): In this seminar, we investigate gun violence from a critical perspective that draws on social and health sciences, films, media, and more. While we take the contemporary issue of gun violence in the United States as a primary case study, we employ a global and comparative perspective. We explore controversies to include cultural, gendered, ethnic, political, and economic analysis. We examine discourses on gun violence as rational/irrational, healthy/pathological, and individually or socially produced.

Biological Sciences

BILD 3 Organismic and Evolutionary Biology (4): The first principles of evolutionary theory, classification, ecology, and behavior; a phylogenetic synopsis of the major groups of organisms from viruses to primates.

BILD 18 Human Impact on the Environment (4): Course will focus on issues such as global warming, species extinction, and human impact on the oceans and forests. History and scientific projections will be examined in relation to these events. Possible solutions to these worldwide processes and a critical assessment of their causes and consequences will be covered.

BILD 26 Human Physiology (4): Introduction to the elements of human physiology and the functioning of the various organ systems. The course presents a broad, yet detailed, analysis of human physiology, with particular emphasis toward understanding disease processes. This course is designed for non-biology students and does not satisfy a lower-division requirement for any biology major. Open to non-biology majors only. Exclude the following major codes: BI28, BI29, BI30, BI31, BI32, BI33, BI34, BI35, and BI36. Note: Students may not receive credit for BILD 26 after receiving credit for BIPN 100.

BILD 36 AIDS Science and Society (4): An introduction to all aspects of the AIDS epidemic. Topics will include the epidemiology, biology, and clinical aspects of HIV infection; HIV testing; education and approaches to therapy; and the social, political, and legal impacts of AIDS on the individual and society. This course is designed for non-biology students and does not satisfy a lower-division requirement for any biology major. Open to non-biology majors only. Exclude the following major codes: BI28, BI29, BI30, BI31, BI32, BI33, BI34, BI35, and BI36. Note: Students may not receive credit for BILD 36 after receiving credit for BICD 136.
BILD 38 Dementia, Science, and Society (4): Introduction to basic human neuroscience leading to a discussion of brain diseases classified under the rubric Dementia. Topics include basic brain structure and function, diseases of the aging brain and their economic, social, political and ethical impacts on society.

BILD 60 Exploring Issues of Diversity, Equity, and Inclusion in Relation to Human Biology (4): This course will examine diversity, equity, and inclusion beginning with a biological framework. Focus will be on how underlying biological differences have been used to support bias and prejudice against particular groups such as women, African Americans, and Latinos. This course is approved to meet the campus Diversity, Equity, and Inclusion (DEI) requirement. Prerequisites: BILD 1 and BILD 2 or 3.

Biological Sciences: Genetics, Cellular and Developmental Biology of Plants and Animals

BICD 100 Genetics (4): An introduction to the principles of heredity emphasizing diploid organisms. Topics include Mendelian inheritance and deviations from classical Mendelian ratios, pedigree analysis, gene interactions, gene mutation, linkage and gene mapping, reverse genetics, population genetics, and quantitative genetics. Prerequisites: BILD 1

BICD 110 Cell Biology (4): The structure and function of cells and cell organelles, cell growth and division, motility, cell differentiation and specialization. Prerequisites: BIBC 100 or BIBC 102.

BICD 136 AIDS Science and Society (4): An introduction to all aspects of the AIDS epidemic. Topics will include the epidemiology, biology, and clinical aspects of HIV infection, HIV testing, education and approaches to therapy, and the social, political, and legal impacts of AIDS on the individual and society. In order to count for their major, biology majors must take the upper-division course, BICD 136. Prerequisites: BILD 1, BILD 2 recommended.

BICD 140 Immunology (4): Formation and function of the mammalian immune system, molecular and cellular basis of the immune response, infectious diseases and autoimmunity. Prerequisites: BICD 100, BIMM 100. BIBC 100 recommended.

Biological Sciences: Molecular Biology, Microbiology

BIMM 100 Molecular Biology (4): Molecular basis of biological processes, emphasizing gene action in context of entire genome. Chromosomes and DNA metabolism: chromatin, DNA replication, repair, mutation, recombination, transposition. Transcription, protein synthesis, regulation of gene activity. Prokaryotes and eukaryotes. Students will not receive credit for both BIMM 100 and Chem 114C. Prerequisites: BILD 1 and BIBC 100 or BIBC 102.

BIMM 110 Molecular Basis of Human Disease (4): An examination of the molecular basis of human diseases. Course emphasizes inherited human disorders, and some important diseases caused by viruses. Focus on the application of genetic, biochemical, and molecular biological principles to an understanding of the diseases. Prerequisites: BICD 100; BIBC 100 or BIBC 102; BIMM 100, upper-division standing.

BIMM 114 Virology (4): An introduction to eukaryotic virology, with emphasis on animal virus systems. Topics discussed include the molecular structure of viruses; the multiplication strategies of the major virus families; and viral latency, persistence, and oncology. Prerequisites: BIMM 100.

BIMM 124 Medical Microbiology (4): Encompasses the increasingly important areas of viral, bacterial, and parasitic diseases and understanding the complex interaction between humans and infectious agents. Covers human-pathogen interactions, mechanisms and molecular principles of infectious diseases,
immune responses, countermeasures by pathogens and hosts, epidemiology, and cutting-edge approaches to therapy. **Prerequisites:** BIBC 100 or BIBC 102.

**Biological Sciences: Biochemistry**

**BIBC 100 Structural Biochemistry (4):** The structure and function of biomolecules. Includes protein conformation, dynamics, and function; enzymatic catalysis, enzyme kinetics, and allosteric regulation; lipids and membranes; sugars and polysaccharides; and nucleic acids. **Prerequisites:** Chemistry 140A and Chemistry 140B.

**BIBC 120 Nutrition (4):** Elaborates the relationship between diet and human metabolism, physiology, health, and disease. Covers the functions of carbohydrates, lipids, proteins, vitamins, and minerals, and discusses dietary influences on cardiovascular disease, diabetes, obesity, and cancer. **Prerequisites:** BIBC 102.

**Biological Sciences: Ecology, Behavior, and Evolution**

**BIEB 150 Evolution (4):** Evolutionary processes are discussed in their genetic, historical, and ecological contexts. Population genetics, agents of evolution, microevolution, speciation, macroevolution. **Prerequisites:** BILD 3 and BILD 1 or BIEB 143.

**BIEB 176 Biology of Conservation and the Human Predicament (4):** Discussion of the human predicament, biodiversity crisis, and importance of biological conservation. Examines issues from biological perspectives emphasizing new approaches and new techniques for safeguarding the future of humans and other biosphere inhabitants. **Prerequisites:** BILD 3.

**Biological Sciences: Physiology and Neuroscience**

**BIPN 100 Human Physiology I (4):** Course introduces the concepts of physiological regulation, controlled and integrated by the nervous and endocrine systems. Course then examines the muscular, cardiovascular, and renal systems in detail and considers their control through the interaction of nervous activity and hormones. Students may not receive credit for both BIPN 100 and BENG 140A. **Prerequisites:** BILD 1 and BILD 2.

**BIPN 102 Human Physiology II (4):** Course completes a survey of organ systems begun in BIPN 100 by considering the respiratory and gastrointestinal systems. Consideration is given to interactions of these systems in weight and temperature regulation, exercise physiology, stress, and pregnancy and reproduction. Students may not receive credit for both BIPN 102 and BENG 140B. **Prerequisites:** BIPN 100.

**BIPN 134 Human Reproduction (4):** Course focuses on physiological aspects of the human reproductive systems. Emphasis will be on cellular and systems physiology. Topics will include: reproductive endocrinology, gametogenesis, fertilization and implantation, pregnancy and parturition, development of reproductive systems, and reproductive pathologies. Students may not receive credit for both BIPN 134 and BICD 134. **Prerequisites:** BIPN 100.

**Cognitive Science**
COGS 11 Minds and Brains (4): How damaged and normal brains influence the way humans solve problems, remember or forget, pay attention to things; how they affect our emotions, and the way we use language in daily life.

COGS 17 Neurobiology of Cognition (4): Introduction to the organization and functions of the nervous system. Topics include molecular, cellular, developmental, systems, and behavioral neurobiology. Specifically, structure and function of neurons, peripheral and central nervous systems, sensory, motor, and control systems, learning and memory mechanisms.

COGS 174 Drugs: Brain, Mind, and Culture (4): This course explores how drugs interact with the brain/mind and culture. It covers evolutionary and historical perspectives, brain chemistry, pharmacology, expectancies and placebo effects, and models of addiction. It also provides a biopsychosocial survey of commonly used and abused substances. Prerequisites: upper-division standing.

Critical Gender Studies

CGS 111 Gender and the Body (4): Various approaches to the study of gendered bodies. Possible topics to include masculinities/femininities; lifecycles; biology, culture, and identity; medical discourses; and health issues. May be taken for credit three times when topics vary.

CGS 114 Gender, Race, Ethnicity, and Class (4): Gender is often neglected in studies of ethnic/racial politics. This course explores the relationship of race, ethnicity, class, and gender by examining the participation of working class women of color in community politics and how they challenge mainstream political theory.

Communication

COMM 112G IM (4): Language and Globalization: The interaction of language and culture in human communication. New and old languages, standard and dialect, dominant and endangered are the special focus. Selected languages as examples of how languages exist in contemporary contexts. Students will not receive credit for COHI 135 and COMM 112G. Prerequisites: COMM 10.


COMM 152 Global Economy and Consumer Culture (4): This course critically examines social and economic forces that shape the making of this new global consumer culture by following the flows of consumption and production between the developed and developing worlds in the 1990s. We will consider how consumers, workers, and citizens participate in a new globalized consumer culture that challenges older distinctions between the First and the Third World. In this course, we will focus on the flows between the United States, Asia, and Latin America. Prerequisites: COMM 10 and one from COMM 100A, 100B, 100C.

COMM 179 Global Nature/Global Culture (4): Considers globalization’s impact on concepts of nature in and through media texts, information systems, circulation of consumer goods and services, and the emergence of global brands, science, health initiatives, environmental media activism, and technology transfer in the twentieth and early twenty-first centuries. Prerequisites: COMM 10 and one from COMM 100A, 100B, 100C.
COMM 179 Media and Technology (4): Global Nature and Global Culture: Considers globalization’s impact on concepts of nature in and through media texts, information systems, circulation of consumer goods and services, and the emergence of global brands, science, health initiatives, environmental media activism, and technology transfer in the twentieth and early twenty-first centuries. Students will not receive credit for COCU 141A and COMM 179. Prerequisites: COMM 10 and one from COMM 100A, 100B, 100C.

Economics

ECON 140 Economics of Health-Care Producers (4): Provides an overview of the physician, hospital, and pharmaceutical segments of the health sector. Uses models of physician behavior, for-profit and nonprofit institutions to understand the trade-offs facing health-sector regulators and the administrators of public and private insurance arrangements. Prerequisites: Econ 2 or 100B

ECON 141 Economics of Health-Care Consumers (4): Demand for health care and health insurance, employer-provision of health insurance and impact on wages and job changes. Cross-country comparisons of health systems. Prerequisites: Econ 100C.

Environmental Studies

ENVR 30 Environmental Issues: Natural Sciences (4): Examines global and regional environmental issues. The approach is to consider the scientific basis for policy options. Simple principles of chemistry and biology are introduced. The scope of problems includes: air and water pollution, climate modification, solid waste disposal, hazardous waste treatment, and environmental impact assessment

Ethnic Studies

ETHN 142 Medicine, Race, and the Global Politics of Inequality (4): Globalization fosters both the transmission of AIDS, cholera, tuberculosis, and other infectious diseases and gross inequalities in the resources available to prevent and cure them. This course focuses on how race, ethnicity, gender, sexuality, class, and nation both shape and are shaped by the social construction of health and disease worldwide.

Family Medicine and Public Health

FMPH 101 Epidemiology (4): This course covers the basic principles of epidemiology, with applications to investigations of noninfectious (“chronic”) and infectious diseases. Explores various study designs appropriate for disease surveillance and studies of etiology and prevention. Prerequisites: FMPH 40; PSYC 60 or MATH 11; and upper-division standing.

FPMU 102 Biostatistics in Public Health (4): Fundamentals of biostatistics and basic methods for analysis of continuous and binary outcomes for one, two, or several groups. Includes: summarizing and displaying data; probability; statistical distributions; central limit theorem, confidence intervals, hypothesis testing; comparing means of continuous variables between two groups; comparing proportions between two groups; simple and multiple linear regression. Hands-on data analysis using software and statistical applications in public health. Prerequisites: FPMU 40; PSYC 60 or MATH 11 or MATH 3C or MATH 10A or MATH 10B

FPMU 110 Health Behavior and Chronic Disease (4): This course introduces health behavior concepts through applications to chronic disease prevention. The focus is on smoking, dietary behaviors, and
physical activity and is organized around relationships to health, measurement, influencing factors, interventions, and translation to public health practice. **Prerequisites**: FPMU 40

**Global Health Program**

**GLBH 100 Special Topics in Global Health (4)**: Selected topics in Global Health. Content will vary from quarter to quarter.

**GLBH 129 Meaning and Healing (4)**: This course examines the nature of healing across cultures, with special emphasis on religious and ritual healing.

**GLBH 160 Global Health Policy (4)**: Students will learn fundamental principles and concepts of global health policy, law, and governance. The course will focus on identifying critical global health policy challenges and solving them using a multidisciplinary approach that takes into account the perspectives of various stakeholders.

**GLBH 198 Directed Group Study (4)**: Directed group study for students to elaborate the intellectual analysis and critique of the required field experience for students enrolled in the Global Health program. **Prerequisites**: departmental authorization required.

**GLBH 199 Independent Study in Global Health Field Experience (4)**: Independent study opportunity for students to elaborate the intellectual analysis and critique of the required field experience for students enrolled in the Global Health program. **Prerequisites**: departmental authorization required.

**Human Development Program**

**HDP 110 Brain and Behavioral Development (4)**: The purpose of this course is to familiarize students with basic mechanisms of brain and behavioral development from embryology through aging. Multiple levels of analysis will be discussed, including the effects of hormones on behavior, developmental events at the level of cells, structures, and neural systems, and the neural basis of cognition, social, perceptual, and language development. **Prerequisites**: HDP 1 or PSYC 101.

**HDP 160 Special Topics Seminar in Human Development (4)**: Special topics in human development are discussed.

**History**

**HISC 108 Life Sciences in the Twentieth Century (4)**: The history of twentieth-century life sciences, with an emphasis on the way in which model organisms such as fruit flies, guinea pigs, bacteriophage, and zebra fish shaped the quest to unlock the secrets of heredity, evolution, and development.

**HISC 109 Invention of Tropical Disease (4)**: Explores the origins of the idea of the “tropics” and “tropical disease” as a legacy of European conquest and colonization, and introduces students to themes in the history of colonialism, tropical medicine, and global public health.

**HISC 115 History of Modern Medicine (4)**: Explores the origin of clinical method, the hospital, internal surgery, and the medical laboratory, as well as the historical roots of debates over health-care reform, genetic determinism, and the medicalization of society.
HISC 116 History of Bioethics (4): The story behind the postwar rise of bioethics—medical scandals breaking in the mass media, the development of novel technologies for saving and prolonging life, the emergence of new diseases, the unprecedented scope for manipulation opened up by biology.

Latin American Studies

LATI 122A Field Research Methods for Migration Studies (4): Seminar: Introductory survey of methods used by social and health scientists to gather primary research data on international migrant and refugee populations, including sample surveys, unstructured interviewing, and ethnographic observation. Basic fieldwork practices, ethics, and problem-solving techniques will also be covered. Students may not receive credit for both SOCI 122A and LATI 122A. Recommended: advanced competency in conversational Spanish. Prerequisites: permission of instructor (department authorization required).

LATI 122B Field Research Methods for Migration Studies (4): Practicum: Students will collect survey and qualitative data among Mexican migrants to the United States and potential migrants, participate in team research, organize data collected for analysis, and submit a detailed outline of an article to be based on field data. Students may not receive credit for both SOCI 122B and LATI 122B. Recommended: advanced competency in conversational Spanish. Prerequisites: LATI 122A; permission of instructor (department authorization required)

Literature

LTCS 155 Health, Illness and Global Culture (4): The course will examine one or more forms of cultural production or cultural practice from a variety of theoretical and historical perspectives. Topics may include: contemporary debates on culture, genres of popular music/fiction/film, AIDS and culture, the history of sexuality, subcultural styles, etc. Repeatable for credit when topics vary.

LTCS 165 Special Topics (4): The Politics of Food this course will examine the representation and politics of food in literary and other cultural texts. Topics may include: food and poverty, the fast food industry, controversies about seed, sustainable food production, myths about hunger, eating and epistemology, aesthetics, etc. Repeatable for credit up to three times when topics vary.

Philosophy

PHIL 150 Philosophy of Cognitive Science (4): Theoretical, empirical, methodological, and philosophical issues at work in the cognitive sciences (e.g., psychology, linguistics, neuroscience, artificial intelligence, and computer science), concerning things such as mental representation, consciousness, rationality, explanation, and nativism.

PHIL 163 Biomedical Ethics (4): Moral issues in medicine and the biological sciences, such as patient’s rights and physician’s responsibilities, abortion and euthanasia, the distribution of health care, experimentation, and genetic intervention.

PHIL 164 Technology and Human Values (4): Philosophical issues involved in the development of modern science, the growth of technology, and control of the natural environment. The interaction of science and technology with human nature and political and moral ideals.

PHIL 173 Topics in Bioethics (4): An in-depth exploration of an issue in Bioethics. Topics will vary, and may include the ethics of genetic engineering, mental capacity and genuinely informed consent, the just distribution of health care, the ethics of geo-engineering, and the ethics of climate change and health
Political Science

POLI 108 Politics of Multiculturalism (4): This course will examine central issues in debates about race, ethnicity, and multiculturalism in the United States. It will look at relations not only between whites and minorities, but also at those among racial and ethnic communities.

POLI 111D Social Norms and Global Development (4): Study of types of social norms and practices, and how to change them. Illustrated with development examples such as the end of footbinding, female genital cutting, urban violence in Colombia, Serbian student revolution, early marriage, and other adverse gender norms.

POLI 113A East Asian Thought in Comparative Perspective (4): This course examines the major traditions of East Asian thought in comparative perspective. Topics include Confucianism, Taoism, Buddhism, and contemporary nationalist and East Asian political thought. Throughout, focused comparisons and contrasts will be made between western and eastern thought. Prerequisites: upper-division standing.

POLI 122 Politics of Human Rights (4): What do we mean by “international human rights”? Are they universal? This course examines human rights abuse and redress over time, and across different regions of the world. From this empirically grounded perspective, we critically evaluate contemporary human rights debates.

POLI 125 Gender, Politics and Globalization (4): What have been the effects of globalization on gender, and how has gender shaped conceptions and processes of globalization? Through case studies drawn from the global north and south, this course critically assesses contemporary theoretical debates on global gender justice.

POLI 125B The Politics of Food in a Global Economy (4): This course explores emerging issues in production and consumption of food in a global economy. On production side, we discuss issues such as famine, overproduction of commercial crops, and sustainability. On consumption side, we explore issues such as fair trade, ethical consumption, and public health consequences (such as obesity). Then we discuss the roles of governments, international organizations, and communities to address these issues.

POLI 127 Politics of Developing Countries (4): This course critically examines central concepts and theories of development, and assesses their utility in understanding political, economic, and social change in the developing world. Central case studies are drawn from three regions: Latin America, Sub-Saharan Africa, and Southeast Asia.

POLI 136A Nationalism and Politics (4): An examination of nationalist politics as practiced by opposition movements and governments in power. Appropriate case studies from around the world will be selected.


POLI 145A International Politics and Drugs (4): This course examines the domestic and international aspects of the drug trade. It will investigate the drug issues from the perspectives of consumers, producers, traffickers, money launderers, and law enforcement. Course material covers the experience of the United States, Latin America, Turkey, Southeast Asia, Western Europe, and Japan.
POLI 150A Politics of Immigration (4): Comparative analysis of attempts by the United States and other industrialized countries to initiate, regulate and reduce immigration from Third World countries. Social and economic factors shaping outcomes of immigration policies, public opinion toward immigrants, anti-immigration movements, and immigration policy reform options in industrialized countries.

POLI 151 International Organizations (4): Surveys the theory and function of IOs (UN, NATO, EU, World Bank, IMF) in promoting international cooperation in security, peacekeeping, trade, environment, and human rights. We discuss why IOs exist, how they work, and what challenges they face.

Prerequisites: POLI 12

Psychology

PSYC 100 Clinical Psychology (4): This course provides a comprehensive overview of the causes, characteristics, and treatment of psychological disorders. Particular emphasis is given to the interaction between biological, psychological, and sociocultural processes contributing to abnormal behavior. Students may not receive credit for both Psychology 163 and Psychology 100.

PSYC 101 Developmental Psychology (4): This course provides a comprehensive overview of the field of developmental psychology, including topics in cognitive, language, and social development.

PSYC 110 Juniors Honors Research Seminars (4): This course provides research seminars by a range of departmental faculty, exposing students to contemporary research problems in many areas of psychology. Class discussions will follow faculty presentations. Must be taken for a letter grade for the Psychology Honors Program

PSYC 116 Laboratory in Clinical Psychology Research (4): This course provides examination of theory, research design, and methods for clinical research. Students complete an internship at a clinical research lab, culminating in a paper. May be taken for credit three times. Students may not receive credit for both PSYC 116 and PSYC 107.

PSYC 124 Clinical Assessment and Treatment (4): This course provides an introduction to the history, purpose, and recent changes to the Diagnostic and Statistical Manual of Mental Disorders along with appropriate evidence-based interventions. Other topics include psychiatric emergencies, crisis management, and ethics. Recommended preparation: Completion of Psychology 100.

PSYC 125 Clinical Neuropsychology (4): This course provides a fundamental understanding of brain-behavior relationships as applied to the practice of clinical neuropsychology. Major topics include functional neuroanatomy, principles of neuropsychological assessment and diagnosis, and the neuropsychological presentation of common neurologic and psychiatric conditions.

PSYC 134 Eating Disorders (4): This course provides an overview of the biology and psychology of eating disorders such as anorexia nervosa, bulimia nervosa, and binge eating disorder. Abnormal, as well as normal, eating will be discussed from various perspectives including endocrinological, neurobiological, psychological, sociological, and evolutionary.

PSYC 155 Social Psychology and Medicine (4): This course provides an exploration of health, illness, treatment, and delivery of treatment as they relate to psychological concepts and research and considers how the social psychological perspective might be extended into medical fields
PSYC 168 Psychological Disorders of Childhood (4): This course provides an overview of psychological disorders in children. Topics may include anxiety disorders, depressive and bipolar disorders, communication and learning disorders, conduct problems, autism, and other conditions. Emphasis is placed on symptomatology, assessment, etiological factors, epidemiology, and treatment.

PSYC 172 Psychology of Human Sexuality (4): This course provides an overview of human sexuality research including diversity of sexual behavior and identities, sex and gender development, intimate relationships, and sexual dysfunction. Recommended preparation: completion of Psychology 1, 2, or 106. Prerequisites: upper-division standing.

PSYC 179 Drugs, Addiction, and Mental Disorders (4): This course provides an overview of the use, abuse, liability, and psychotherapeutic effects of drugs on humans.

PSYC 181 Drugs and Behavior (4): Develops basic principles in psychopharmacology while exploring the behavioral effects of psychoactive drugs and mechanisms of action of drugs.

PSYC 188 Impulse and Control Disorders (4): This course provides an overview of problems of impulse control, which are important features of major psychiatric disorders and also of atypical patterns of behavior including pathological gambling, compulsive sex, eating, exercise, and shopping. Topics include development, major common features, treatment, and neurobiological basis of impulse control disorders. Prerequisites: upper-division standing.

Scripps Institution of Oceanography

SIO 16 Geology of the National Parks (4): An introduction to fundamental concepts of geology and environmental science through the lens of the national park system. Topics covered include the geologic time scale; plate tectonics; igneous, metamorphic, and sedimentary processes; geomorphology; climate change; and environmental degradation.

SIO 189 Pollution, the Environment, and Health (4): The goal is to understand the scope of the pollution problem facing the planet. Students will learn the properties of chemicals in the environment and survey the biological mechanisms that determine their accumulation and toxicity. Prerequisites: Chemistry 6C and BILD 1 or 3 or consent of instructor.

Sociology

SOCI 107 Epidemiological Methods: Statistical Study of Disease (4): Epidemiology is the statistical study of disease, and epidemiological methods are a powerful tool for understanding the causes of certain diseases, e.g., AIDS, scurvy, cholera, and lung cancer. These fundamental epidemiological methods will be taught. Prerequisites: SOCI 60. Will not receive credit for SOCI 107 and SOCA 107.

SOCI 113 Sociology of the Aids Epidemic (4): This course considers the social, cultural, political, and economic aspects of HIV/AIDS. Topics include the social context of transmission; the experiences of women living with HIV; AIDS activism; representations of AIDS; and the impact of race and class differences.

SOCI 127 Immigration, Race, and Ethnicity (4): Examination of the role that race and ethnicity play in immigrant group integration. Topics include theories of integration, racial and ethnic identity formation, racial and ethnic change, immigration policy, public opinion, comparisons between contemporary and historical waves of immigration.
SOCI 134 The Making of Modern Medicine (4): A study of the social, intellectual, and institutional aspects of the nineteenth-century transformation of clinical medicine, examining both the changing content of medical knowledge and therapeutics, and the organization of the medical profession.

SOCI 135 Medical Sociology (4): An inquiry into the roles of culture and social structure in mediating the health and illness experiences of individuals and groups. Topics include the social construction of illness, the relationships between patients and health professionals, and the organization of medical work.

SOCI 136E Sociology of Mental Illness (4): An Historical Approach: An examination of the social, cultural, and political factors involved in the identification and treatment of mental illness. This course will emphasize historical material, focusing on the eighteenth, nineteenth, and early twentieth centuries. Developments in England as well as the United States will be examined from an historical perspective.

SOCI 136F Sociology of Mental Illness in Contemporary Society (4): This course will focus on recent developments in the mental illness sector and on the contemporary sociological literature on mental illness. Developments in England as well as the United States will be examined.

SOCI 138 Genetics and Society (4): The class will first examine the direct social effects of the “genetic revolution”: eugenics, genetic discrimination, and stratification. Second, the implications of thinking of society in terms of genetics, specifically—sociobiology, social Darwinism, evolutionary psychology, and biology.

SOCI 143 Suicide (4): Traditional and modern theories of suicide will be reviewed and tested. The study of suicide will be treated as one method for investigating the influence of society on the individual.

SOCI 185 Globalization and Social Development (4): Social development is more than sheer economic growth. It entails improvements in the overall quality of human life, particularly in terms of access to health, education, employment, and income for the poorer sectors of the population. Course examines the impact of globalization on the prospects for attaining these goals in developing countries.

SOCI 188E Community and Social Change in Africa (4): The process of social change in African communities, with emphasis on changing ways of seeing the world and the effects of religion and political philosophies of social change. The methods and data used in various village and community studies in Africa will be critically examined.

SOCI 188J Change in Modern South Africa (4): Using sociological and historical perspectives, this course examines the origins and demise of apartheid and assesses the progress that has been made since 1994, when apartheid was officially ended. Contrasts of racism in South Africa and the United States.

Urban Studies and Planning

USP 143 The US Health-Care System (4): This course will provide an overview of the organization of health care within the context of the community with emphasis on the political, social, and cultural influences. It is concerned with the structure, objectives, and trends of major health and health-related programs in the United States to include sponsorship, financing, training and utilization of health personnel.

USP 144 Environmental and Preventive Health Issue (4): This course will analyze needs of populations, highlighting current major public health problems such as chronic and communicable diseases, environmental hazards of diseases, psychiatric problems and additional diseases, new social mores affecting health maintenance, consumer health awareness and health practices, special needs of
economically and socially disadvantaged populations. The focus is on selected areas of public and environmental health, namely: epidemiology, preventive services in family health, communicable and chronic disease control, and occupational health.

**USP 145 Aging: The Social and Health Policy Issues (4):** This course will provide a brief introduction to the nature and problems of aging, with emphasis on socioeconomic and health status; determinants of priorities of social and health policies will be examined through analysis of the structure and organization of selected programs for the elderly. Field visits will constitute part of the course.

**USP 147 Case Studies in Health-Care Programs/Poor and Underserved Populations (4):** The purpose of this course is to identify the special health needs of low income and underserved populations and to review their status of care, factors influencing the incidence of disease and health problems, and political and legislative measures related to access and the provision of care. Selected current programs and policies that address the health-care needs have selected underserved populations such as working poor, inner city populations, recent immigrants, and persons with severe disabling mental illnesses will be studied. Offered in alternate years.

**Master of Arts in Global Health (Proposed)**

**Program Description**

The degree will have a contiguous degree option for current UCSD Global Health majors, where students can complete their BA and MA in Global Health in 5 years and a standalone option for students from outside the university and/or major, which can also be completed in one academic year.

Students are required to complete 9 courses/36 units total including 5 core courses that address Global Health Policy, Social Epidemiology, Global Health Research, Medical Anthropology and a core seminar that will focus on preparing students for their comprehensive exam or thesis and exploration of careers in global health.

Students entering from outside the BAGH will complete two additional core courses required of our BA students. Students will choose two of the following courses: Essentials of Global Health, Global Health and Cultural Diversity, and Project Management in the Health Services.

**Degree Requirements**

**REQUIRED / CORE COURSES (20 UNITS)**

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<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Number of Units</th>
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<tbody>
<tr>
<td>GLBH 200</td>
<td>Global Health Masters Core Seminar</td>
<td>4</td>
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<tr>
<td>GLBH 248</td>
<td>Introduction to Global Health Research</td>
<td>4</td>
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<tr>
<td>GLBH 249</td>
<td>Social Epidemiology</td>
<td>4</td>
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<tr>
<td>GLBH 260</td>
<td>Global Health Policy</td>
<td>4</td>
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<tr>
<td>ANTH 260</td>
<td>Seminar in Medical and Psychological Anthropology</td>
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**ELECTIVES (16 UNITS)**

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<tr>
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<tr>
<td>GLBH 200 (Research Track)</td>
<td>Global Health Masters Core Seminar</td>
<td>4 (2 Minimum)</td>
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<td>Approved Courses</td>
<td>Electives</td>
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**CAPSTONE**

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<th>Course Number</th>
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<tr>
<td></td>
<td>Comprehensive Exam or Thesis</td>
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Current List of MGH Degree Courses

MGH Core Requirements

ANTH 248 Global Health and Cultural Diversity (4): This seminar investigates global health from the perspective of medical anthropology on disease and illness; cultural conceptions of health; doctor-patient interaction; illness experience; medical science and technology; mental health; infectious disease; and health-care inequalities by ethnicity, gender, and socioeconomic status. May be co-scheduled with ANSC/GLBH 148. Students may not receive credit for ANSC/GLBH 148 and ANTH 248. Prerequisites: graduate standing.

ANTH 260 Seminar in Medical and Psychological Anthropology (4): This seminar examines medical, psychological, and psychiatric anthropology through reading, discussion, and presentation of work 1) essential to the development of and 2) exemplifying the state of the art in these related fields. May be taken for credit up to two times. Prerequisites: graduate standing. In addition, students in the standalone MA degree will complete two of the following three courses

GLBH 200 Global Health Masters Core Seminar (4): This seminar course consists of workshops to expand on a student's thesis project and readings synthesizing key concepts and problems in the field of Global Health. Students will explore career options in Global Health and prepare a final portfolio to be due at the end of spring quarter.

GLBH 248 Introduction to Global Health Research (4): Students will gain competency in common research methods, and introduced to implementation challenges in Global Health. Students will critically evaluate the impact of sociocultural factors on health disparities. This knowledge can be applied towards future research experiences and career development. May be co-schedule with SOMU 248. Students may not receive credit for SOMU 248 and GLBH 248.

GLBH 249 Social Epidemiology (4): This course provides an overview of social epidemiology, a branch of epidemiology that focuses on the study of how health-related states or events are impacted by social, political, cultural, and economic factors. Students will learn about the history and current state of the science of social epidemiology, its leading theories/paradigms and methods, and distinct core areas of research.

GLBH 260 Global Health Policy (4): Students will learn fundamental principles and concepts of global health policy, law, and governance. The course will focus on identifying critical global health policy challenges and solving them using a multidisciplinary approach that takes into account the perspectives of various stakeholders. May be co-scheduled with GLBH 160. Students may not receive credit for GLBH 160 and GLBH 161.

GLBH 281 Essentials of Global Health (4): Illustrates and explores ecologic settings and frameworks for study and understanding of global health and international health policy. Students acquire understanding of diverse determinants and trends of disease in various settings and interrelationships between socio-cultural-economic development and health. Students may not receive credit for GLBH 181 and GLBH 281. Prerequisites: graduate standing.

MGT 173 Project Management in the Health Services (4): This course covers efficient techniques for managing health services projects, including both the technical aspects of project management as well as the human-capital management issues associated with blending administrative and technical staff with health-care professionals. Topics include scheduling methods, milestone setting, governmental
regulations, resource allocation, interpersonal skills, and performing research and development projects—all with a health services focus.

**Current List of MGH Electives**

**Anthropology**

**ANSC 101 Aging: Culture and Health in Late Life Human Development (4):** Examines aging as process of human development, from local and global perspectives. Focuses on the interrelationships of social, cultural, psychological, and health factors that shape the experience and well-being of aging populations. Students explore the challenges and wisdom of aging. **Prerequisites:** upper-division standing.

**ANSC 106 Global Health: Indigenous Medicines in Latin America (4):** Drawing on medical anthropology ethnography, students will explore a variety of forms of healing among rural and urban indigenous communities. A particular focus on intercultural health will allow the students to analyze contemporary medical landscapes where patients encounter indigenous and Western medicine. Students will learn about the complexities of urban and rural indigenous healing settings and their sociopolitical significance in contexts of state biomedical interventions.

**ANSC 146 A Global Health Perspective on HIV/AIDS (4):** An introductory course on HIV taught through a medical student format, with emphasis on research and experiential learning, including observation of physicians providing care for patients from diverse socioeconomic and cultural backgrounds, some of whom may be underinsured/uninsured, homeless, and/or immigrants.

**ANSC 147 Global Health and the Environment (4):** Examines interactions of culture, health, and environment. Rural and urban human ecologies, their energy foundations, sociocultural systems, and characteristic health and environmental problems are explored. The role of culture and human values in designing solutions will be investigated.

**ANSC 155 Humanitarian Aid: What is it Good For? (4):** This course examines the intended and unintended consequences of humanitarian aid. How do organizations negotiate principles of equality with the reality of limited resources? What role does medicine play in aid efforts? In spaces where multiple vulnerabilities coexist, how do we decide whom we should help first? While the need for aid, charity, and giving in the face of suffering is often taken as a commonsensical.

**ANSC 164 Anthropology of Medicine (4):** Basic concepts and theory of medical anthropology are introduced and applied to comparison of medical systems including indigenous and biomedical, taking into account cross-cultural variation in causal explanation, diagnosis, perception, management, and treatment of illness and disease.

**ANTH 212 Advanced Topics in Biological Anthropology (4):** A critical exploration of timely and/or controversial topics in biological anthropology. Course will vary in title and content. **Prerequisites:** graduate standing.

**ANTH 213 Anthropology and Mental Health (4):** This seminar examines intersection of anthropology and psychiatry. Topics include cultural conceptions and social determinants of anxiety, depression, trauma, and psychosis, corporeal experience and manifestation of illness, transnational variation in course and outcome, global circulation of psychiatric knowledge/practice and pharmaceuticals. **Prerequisites:** graduate standing.
ANTH 229 Religion and Healing (4): This seminar is an in-depth analysis of cultural meaning, personal experience, and therapeutic process in ritual healing, emphasizing performative/persuasive aspects of the relation between religion and health in comparative, cross-cultural perspective. Prerequisites: graduate standing.

ANTH 243 Mental Health as Global Health Priority (4): Why is mental health a global concern? This anthropological course reviews globalization, culture, and mental health. We examine issues of social suffering, stigma, and economic burden associated with mental illness, gender inequality, political violence, "global security," pharmaceutical and illegal drugs. Prerequisites: graduate standing.

ANTH 249 Gender and Mental Health (4): This course examines gender and mental health by considering social, cultural, and biological explanations for problems such as depression, trauma, anxiety, and drugs/alcohol use. Cross-cultural similarities and differences of gender are considered with respect to etiology, epidemiology, symptomatology, treatment, and recovery. Prerequisites: graduate standing.

ANTH 280C Core Seminar in Psychological Anthropology (4): Core seminar focuses on motives, values, cognition, and qualities of personal experience. Prerequisites: graduate standing in anthropology or consent of instructor.

Communication

COMM 114J CSI: Food Justice (4): Examine food justice from multiple analytical and theoretical perspectives: race, class, diversity, equity, legal-institutional, business, ethical, ecological, scientific, cultural, and socio-technical. Compare political strategies of food justice organizations/movements aimed at creating healthy and sustainable food systems locally and globally.

Economics

ECON 140 Economics of Health-Care Producers (4): Provides an overview of the physician, hospital, and pharmaceutical segments of the health sector. Uses models of physician behavior, for-profit and nonprofit institutions to understand the trade-offs facing health-sector regulators and the administrators of public and private insurance arrangements.

ECON 141 Economics of Health-Care Consumers (4): Demand for health care and health insurance, employer-provision of health insurance and impact on wages and job changes. Cross-country comparisons of health systems.

Ethnic Studies

ETHN 142 Medicine, Race, and the Global Politics of Inequality (4): Globalization fosters both the transmission of AIDS, cholera, tuberculosis, and other infectious diseases and gross inequalities in the resources available to prevent and cure them. This course focuses on how race, ethnicity, gender, sexuality, class, and nation both shape and are shaped by the social construction of health and disease worldwide.

Global Health

GLBH 100 Special Topics in Global Health (4): Selected topics in Global Health. Content will vary from quarter to quarter.
GLBH 105 Global Health and Inequality (4): Why is there variation of health outcomes across the world? We will discuss health and illness in context of culture and address concerns in cross-national health variations by comparing healthcare systems in developed, underdeveloped, and developing countries. Study the role of socioeconomic and political change in determining health outcomes and examine social health determinants in contemporary global health problems: multidrug resistance to antibiotics, gender violence, human trafficking, etc. Students may not receive credit for GLBH 105 and ANSC 105.

GLBH 210 Demography and Social Networks in Global Health (4): This course will provide an overview of demographic principles, and their associations with maternal and child health outcomes. We will focus on demographic trends in developing countries, using research from the DHS to discuss inequalities in fertility, mortality, and morbidity. The remainder of the class will question why we see such spatial variation in many maternal and child health outcomes, with a focus on theories of social norms, and social network methods for uncovering those trends. May be co-scheduled with GLBH 110.

GLBH 211 HFIT Internship: Will be added to the program.

GLBH 244. Immigrant and Refugee Health (4): Examines physical and mental health sequelae of internal and transnational movement of individuals and populations due to warfare, political violence, natural disaster, religious persecution, poverty and struggle for economic survival, and social suffering of communities abandoned by migrants and refugees. May be co-scheduled with ANSC/GLBH 144.

GLBH 245 Native American Health & Healing (4): This course examines fact and fiction with respect to epidemics of contagious diseases including smallpox and tuberculosis, alcohol and drug dependency, diabetes and obesity, depression and suicide. We analyze health care with respect to the history and development of the Indian Health Service, health care efforts by Christian missionaries, tribal-led health initiatives, indigenous spiritual healing, and collaborations between indigenous healers and biomedical professionals.

GLBH 261 Global Health Policy, Diplomacy and Advocacy (4): Students will explore the application of global health policy, governance, and law principles to the practice of global health through case studies and interactive debate simulations. The course will include a series of special and advanced topics in global health, including health migration, funding and innovation for infectious and chronic diseases, disease surveillance, fake medicines, and global health governance reform. Prerequisites: GLBH 160/260.

GLBH 297 Global Health Internship (4): Offers Global Health MA students the opportunity to intern and gain elective credit. Students will intern and work with a faculty advisor to elaborate on the intellectual analysis and critique of the internship.

GLBH 298 Directed Study (4): Supervised study of topics in Global Health literature. Prerequisites: graduate standing in Global Health.

GLBH 299 Independent Research (4): Mentored course in which students will work closely with a faculty advisor to prepare a publishable masters project based on their undergraduate senior thesis or project agreed upon with faculty advisor.

History
HISC 109 Invention of Tropical Disease (4): Explores the origins of the idea of the “tropics” and “tropical disease” as a legacy of European conquest and colonization, and introduces students to themes in the history of colonialism, tropical medicine, and global public health.

HISC 115 History of Modern Medicine (4): Explores the origin of clinical method, the hospital, internal surgery, and the medical laboratory, as well as the historical roots of debates over health-care reform, genetic determinism, and the medicalization of society.

HISC 116 History of Bioethics (4): The story behind the postwar rise of bioethics—medical scandals breaking in the mass media, the development of novel technologies for saving and prolonging life, the emergence of new diseases, the unprecedented scope for manipulation opened up by biology.

School of Global Policy and Strategy (GPS)

GPEC 468 International Health Economics (4): This capstone is intended as a culminating intellectual experience for students, particularly those in economics-oriented tracks. Students will learn to analyze “what works,” integrating a technical understanding of innovation with rigorous statistical analysis. The first half of the course focuses on building a set of science/engineering tools, and the second half on building statistical tools of analysis. Letter grades only. Renumbered from IRCO 468. Students may not receive credit for GPCO 468 and IRCO 468. Prerequisites: GPEC 446 or consent of instructor.

GPPS 430 Human Rights, Public Policy, and International Relations (4): Prepares students to analyze the causes of repression and the effectiveness of political intervention. Attention will focus on the evaluation of the design, implementation, and effectiveness of human rights policy, including international organizations, democracy, trade, and social movement advocacy. Renumbered from IRGN 430. Students may not receive credit for GPPS 430 and IRGN 430.

GPPS 434 Humanitarian Interventions (4): This course encourages sustained debate about US interventions into conflict and post-conflict settings abroad since the end of the Cold War. We will consider the broad trends in international politics, with particular focus on the nature of “unipolarity,” “responsibility to protect,” and the politics of border regions. We will look at both governmental and nongovernmental actors. Renumbered from IRGN 434. Students may not receive credit for GPPS 434 and IRGN 434.

GPEC 458 International Environmental Policy and Politics (4): This course analyzes multilateral environmental agreements and negotiating positions of key countries on climate change, biodiversity conservation, sustainable development, and other subjects. It explores the challenges countries face to balance economic development objectives with global environmental concerns. Renumbered from IRGN 458. Students may not receive credit for GPEC 458 and IRGN 458.

Latin American Studies: Mexican Migration Field Research Program (MMFRP)

LATI 222A Field Research Methods for Migration Studies: Seminar (4): Introductory survey of methods used by social and health scientists to gather primary research data on international migrant and refugee populations, including sample surveys, unstructured interviewing, and ethnographic observation. Basic fieldwork practices, ethics, and problem-solving techniques will also be covered. Students may not receive credit for both SOCI 122A and LATI 122A. Recommended: advanced competency in conversational Spanish. Prerequisites: permission of instructor (department authorization required).

LATI 222B Field Research Methods for Migration Studies: Practicum (12): Students collect survey and qualitative data in Mexican migrants’ communities of origin and destination, serve as team leaders,
organize field data collection within specific subpopulations, and prepare a detailed outline of a proposed journal article to be based on field data. **Prerequisites:** LATI 222A, permission of instructor, advanced competence in conversational Spanish (department authorization required).

**LATI 222C Field Research Methods for Migration Studies: Data Analysis (4):** Serving as team leaders, students design and execute analysis of data they have collected in Mexican and US field research sites, and coauthor a publishable article. Methods for organizing field data, advanced techniques of quantitative and qualitative data analysis, and report preparation conventions are covered. **Prerequisites:** LATI 222B, permission of instructor (department authorization required).

**Literature**

**LTCS 155 Health, Illness, and Global Culture (4):** A medical humanities course that examines compelling written and cinematic accounts of health issues confronting contemporary societies such as environmental pollution, contaminated food supply, recreational drug use, HIV/AIDS, cancer, chronic conditions (allergies, diabetes, obesity, arthritis), famine, natural disasters, and war. May be taken for credit two times when topics vary.

**LTCS 165 Special Topics: The Politics of Food (4):** This course will examine the representation and politics of food in literary and other cultural texts. Topics may include: food and poverty, the fast food industry, controversies about seed, sustainable food production, myths about hunger, eating and epistemology, aesthetics, etc. Repeatable for credit up to three times when topics vary.

**LTWL 177 Literature and Aging (4):** A humanistic approach to the research field of healthy aging. Students learn to bring humanistic practices to the study of aging in the fields of neurobiology, biomedical engineering, neuroscience, and medical education.

**Philosophy**

**PHIL 163 Biomedical Ethics (4):** Moral issues in medicine and the biological sciences, such as patient’s rights and physician’s responsibilities, abortion and euthanasia, the distribution of health care, experimentation, and genetic intervention.

**PHIL 164 Technology and Human Values (4):** Philosophical issues involved in the development of modern science, the growth of technology, and control of the natural environment. The interaction of science and technology with human nature and political and moral ideals.

**PHIL 173 Topics in Bioethics (4):** An in-depth exploration of an issue in Bioethics. Topics will vary, and may include the ethics of genetic engineering, mental capacity and genuinely informed consent, the just distribution of health care, the ethics of geo-engineering, and the ethics of climate change and health.

**Political Science**

**POLI 111D Social Norms and Global Development (4):** Study of types of social norms and practices, and how to change them. Illustrated with development examples such as the end of foot binding, female genital cutting, urban violence in Colombia, Serbian student revolution, early marriage, and other adverse gender norms.

**Psychology**
PSYC 124 Clinical Assessment and Treatment (4): This course provides an introduction to the history, purpose, and recent changes to the Diagnostic and Statistical Manual of Mental Disorders along with appropriate evidence-based interventions. Other topics include psychiatric emergencies, crisis management, and ethics.

PSYC 134 Eating Disorders (4): This course provides an overview of the biology and psychology of eating disorders such as anorexia nervosa, bulimia nervosa, and binge eating disorder. Abnormal, as well as normal, eating will be discussed from various perspectives including endocrinological, neurobiological, psychological, sociological, and evolutionary.

PSYC 155 Social Psychology and Medicine (4): This course provides an exploration of health, illness, treatment, and delivery of treatment as they relate to psychological concepts and research and considers how the social psychological perspective might be extended into medical fields.

PSYC 168 Psychological Disorders of Childhood (4): This course provides an overview of psychological disorders in children. Topics may include anxiety disorders, depressive and bipolar disorders, communication and learning disorders, conduct problems, autism, and other conditions. Emphasis is placed on symptomatology, assessment, etiological factors, epidemiology, and treatment.

PSYC 179 Drugs, Addiction, and Mental Disorders (4): This course provides an overview of the use, abuse, liability, and psychotherapeutic effects of drugs on humans.

PSYC 236 Substance Abuse (4): Theory and research on the development, progression, and resolution of substance use and abuse will be reviewed and evaluated. Normal and abnormal patterns of substance involvement will be contrasted across the lifespan. **Prerequisites**: graduate standing.

PSYC 265 Social Psychology and Medicine (4): Concentrates on what psychology has to contribute to the understanding of illness, its treatment, and the social context in which these processes occur. Topics: psychological factors in the etiology and treatment of illness, doctor-patient roles, and communication. **Prerequisites**: graduate standing.

**Rady School of Management**

MGT 454 Disruptive Technologies for Healthcare (4): Introduces how IT will transform health sciences. Highlights how IT and associated disruptive innovations in health-care delivery will enable physicians, patients, and caregivers to cost effectively prevent, diagnose, and monitor health conditions; manage treatment; and facilitate timely communication and intervention. Letter grades only. Students may not earn credit for both MGT 454 and MGT 274. They are course equivalents.

**Scripps Institution of Oceanography**

SIO 116 Climate Change and Global Health (4): This course explores direct and indirect links between climate change and global health. Course topics include understanding anthropogenic climate change, the impact of climate change on infectious diseases, and the impact of extreme weather events on global health.

SIO 189 Pollution, Environment and Health (4): The goal is to understand the scope of the pollution problem facing the planet. Students will learn the properties of chemicals in the environment and survey the biological mechanisms that determine their accumulation and toxicity. **Prerequisites**: Chemistry 6C and BILD 1 or 3 or consent of instructor. (S)
**SIOB 289 Pollution, Environment, and Health (4):** This course has three major goals. The first is to study the scope and consequences of the pollution problem. The second is to understand the basic properties and fate of chemicals in the environment. The third is to study the biological mechanisms, particularly those operating at the cellular level, that determine accumulation and toxicity of chemicals. By the end of the course, students should have the basic toolkit necessary for evaluating complex information on the effects of pollutants on human and environmental health and an appreciation of the factors that shape our dependence on them.

**Sociology**

**SOCI 113 Sociology of the AIDS Epidemic (4):** This course considers the social, cultural, political, and economic aspects of HIV/AIDS. Topics include the social context of transmission; the experiences of women living with HIV; AIDS activism; representations of AIDS; and the impact of race and class differences.

**SOCI 134 The Making of Modern Medicine (4):** A study of the social, intellectual, and institutional aspects of the nineteenth-century transformation of clinical medicine, examining both the changing content of medical knowledge and therapeutics, and the organization of the medical profession.

**SOCI 135 Medical Sociology (4):** An inquiry into the roles of culture and social structure in mediating the health and illness experiences of individuals and groups. Topics include the social construction of illness, the relationships between patients and health professionals, and the organization of medical work.

**SOCI 136E Sociology of Mental Illness: An Historical Approach (4):** An examination of the social, cultural, and political factors involved in the identification and treatment of mental illness. This course will emphasize historical material, focusing on the eighteenth, nineteenth, and early twentieth centuries. Developments in England as well as the United States will be examined from an historical perspective.

**SOCI 136F Sociology of Mental Illness in Contemporary Society (4):** This course will focus on recent developments in the mental illness sector and on the contemporary sociological literature on mental illness. Developments in England as well as the United States will be examined.

**SOCI 138 Genetics and Society (4):** The class will first examine the direct social effects of the “genetic revolution”: eugenics, genetic discrimination, and stratification. Second, the implications of thinking of society in terms of genetics, specifically—sociobiology, social Darwinism, evolutionary psychology, and biology.

**SOCI 143 Suicide (4):** Traditional and modern theories of suicide will be reviewed and tested. The study of suicide will be treated as one method for investigating the influence of society on the individual.

**SOCI 173 Sociology of Health, Illness and Medicine (4):** This course will explore the social forces that shape our health and the way we understand illness. Themes will include American public health and healthcare, inequality and biomedicine as well as special topics like suicide, lead, autism and HIV/AIDS.

**SOC/G 284 Contemporary Biomedicine (4):** Develops central themes in medical sociology in order to understand twentieth- and twenty-first century medical practice and research. Topics include authority and expertise; health inequalities; managed care; health activism; biomedical knowledge production; and the construction of medical objects and subjects. **Prerequisites:** graduate standing.

**Urban Studies and Planning**
USP 144 Environmental and Preventive Health Issue (4): This course will analyze needs of populations, highlighting current major public health problems such as chronic and communicable diseases, environmental hazards of diseases, psychiatric problems and additional diseases, new social mores affecting health maintenance, consumer health awareness and health practices, special needs of economically and socially disadvantaged populations. The focus is on selected areas of public and environmental health, namely: epidemiology, preventive services in family health, communicable and chronic disease control, and occupational health.

USP 145 Aging: The Social and Health Policy Issues (4): This course will provide a brief introduction to the nature and problems of aging, with emphasis on socioeconomic and health status; determinants of priorities of social and health policies will be examined through analysis of the structure and organization of selected programs for the elderly. Field visits will constitute part of the course.

USP 147 Case Studies in Health-Care Programs/Poor and Underserved Populations (4): The purpose of this course is to identify the special health needs of low income and underserved populations and to review their status of care, factors influencing the incidence of disease and health problems, and political and legislative measures related to access and the provision of care. Selected current programs and policies that address the health-care needs have selected underserved populations such as working poor, inner city populations, recent immigrants, and persons with severe disabling mental illnesses will be studied. Offered in alternate years.

List of Proposed MGH Courses

GLBH 201 Special Topics in Global Health (4): Selected topics in Global Health. Content will vary from quarter to quarter.

GLBH 210 Demography and Social Networks in Global Health (4): This course will provide an overview of demographic principles, and their associations with maternal and child health outcomes. We will focus on demographic trends in developing countries, using research from the DHS to discuss inequalities in fertility, mortality, and morbidity. The remainder of the class will question why we see such spatial variation in many maternal and child health outcomes, with a focus on theories of social norms, and social network methods for uncovering those trends.

GLBH 244 Immigrant and Refugee Health (4): Examines physical and mental health sequelae of internal and transnational movement of individuals and populations due to warfare, political violence, natural disaster, religious persecution, poverty and struggle for economic survival, and social suffering of communities abandoned by migrants and refugees. **Prerequisites**: upper-division standing.

GLBH 245 Native American Health & Healing (4): This course examines fact and fiction with respect to epidemics of contagious diseases including smallpox and tuberculosis, alcohol and drug dependency, diabetes and obesity, depression and suicide. We analyze health care with respect to the history and development of the Indian Health Service, health care efforts by Christian missionaries, tribal-led health initiatives, indigenous spiritual healing, and collaborations between indigenous healers and biomedical professionals.

GLBH 248 Introduction to Global Health Research (4): Students will gain competency in common research methods, and introduced to implementation challenges in Global Health. Students will critically evaluate the impact of sociocultural factors on health disparities. This knowledge can be applied towards future research experiences and career development.
GLBH 249 Social Epidemiology (4): This course provides an overview of social epidemiology, a branch of epidemiology that focuses on the study of how health-related states or events are impacted by social, political, cultural, and economic factors. Students will learn about the history and current state of the science of social epidemiology, its leading theories/paradigms and methods, and distinct core areas of research.

GLBH 260 Global Health Policy (4): Students will learn fundamental principles and concepts of global health policy, law, and governance. The course will focus on identifying critical global health policy challenges and solving them using a multidisciplinary approach that takes into account the perspectives of various stakeholders.

GLBH 261 Global Health Policy, Diplomacy and Advocacy (4): Students will explore the application of global health policy, governance, and law principles to the practice of global health through case studies and interactive debate simulations. The course will include a series of special and advanced topics in global health, including health migration, funding and innovation for infectious and chronic diseases, disease surveillance, fake medicines, and global health governance reform.

GLBH 281 Essentials of Global Health (4): This course provides an overview of global health as a field of research and practice, with an emphasis on use of surveillance and research methods to understand health and determinants of health, evidence-based program development and evaluation of programs in the field, and engagement with governments and advocacy groups to elicit evidence-based policy change. Topics of focus will prioritize infectious diseases, maternal child health, substance use and gender-based violence.

GLBH 297 Global Health Internship (4)

GLBH 298 Directed Study (4): Supervised study and readings of topics in Global Health literature.

GLBH 299 Independent Research (4): Mentored course in which students will work closely with a faculty advisor to prepare a publishable masters project based on their undergraduate senior thesis or project agreed upon with faculty advisor.
APPENDIX C-IV: ANCILLARY GENERAL CAMPUS PUBLIC
HEALTH RELATED PROGRAMS AND CURRICULAR OFFERINGS

Design Lab

Program Description

The minor’s focus is on design as a way of thinking, one based on an iterative cycle of field observation, problem finding, and evaluating alternative solutions and tradeoffs by prototyping and testing. The primary objective of the minor is to enable students from any division and major to diversify their studies and incorporate design thinking skills into their academic experience. To receive a minor in Design, a student must complete at least 28 units of which 20 must be upper division. All courses must be taken for a letter grade with at least a “C-“ earned in each one, with the exception of Design 119 and 195, which are taken Pass/Not Pass.

Current List of Design Lab Courses

Cognitive Science

COGS 10 Cognitive Consequences of Technology (4): The role of cognition and computation in the development of state-of-the art technologies such as human computational interaction in aviation, air traffic control, medical diagnosis, robotics and telerobotics, and the design and engineering of cognitive artifacts.

COGS 102A Distributed Cognition (4): Cognitive processes extend beyond the boundaries of the person to include the environment, artifacts, social interactions, and culture. Major themes include the philosophy and history of cognitive science, the role of artifacts in human cognition, and theories of socially distributed, embodied, and extended cognition. Students may not receive credit for both Cognitive Science 100 and Cognitive Science 102A. Prerequisites: Cognitive Science 1 and Cognitive Science 14A.

COGS 102B Cognitive Ethnography (4): This course examines memory, reasoning, language understanding, learning, and planning directly in everyday, real-world settings. The course work includes projects in which students make observations of real-world activity and analyze their cognitive significance. Prerequisites: upper-division standing.

COGS 102C Cognitive Design Studio (6): This is a project-based course focused on the process of cognitive design. Students work in teams to design and evaluate a prototype application or redesign an existing system. Three hours of lecture and two hours of design laboratory. Prerequisites: Cognitive Science 102B or consent of instructor.

COGS 120 Interaction Design (5): (Cross-listed with CSE 170.) Introduces fundamental methods and principles for designing, implementing, and evaluating user interfaces. Topics: user-centered design, rapid prototyping, experimentation, direct manipulation, cognitive principles, visual design, social software, software tools. Learn by doing: work with a team on a quarter-long design project. Recommended preparation: basic familiarity with HTML. Students may not receive credit for both Cognitive Science 120 and CSE 170. Prerequisites: CSE 11 or CSE 8A and Cognitive Science 1 or Cognitive Science 187A or DSGN 1.
COGS 121 Human Computer Interaction Programming Studio (4): This course covers fundamentals of user interface design and implementation of web-based systems. A major component is completion of a substantial programming project in which students work together in small teams. **Prerequisites:** Cognitive Science 120 and CSE 8B or CSE 11.

COGS 187A Usability and Information Architecture (6): Examines the cognitive basis of successful web and multimedia design. Topics: information architecture, navigation, usability, graphic layout, transaction design, and how to understand user interaction. **Prerequisites:** CSE 7.

COGS 187B Practicum in Professional Web Design (4): This course follows up on the basics of multimedia design taught in Cognitive Science 187A. Students will probe more deeply into selective topics, such as animation, navigation, graphical display of information, and narrative coherence. **Prerequisites:** Cognitive Science 187A or consent of instructor.

Communications

COMM 10 Introduction to Communication (4): Introduction to the history, theory, and practice of communication, including language and literacy, representation and semiotics, mediated technologies and institutional formations, and social interaction. Integrates the study of communication with a range of media production (for example, writing, electronic media, film, performance). COMM 10 may be taken concurrently with the COMM A-B-C courses and intermediate electives. Course is offered fall, winter, and summer quarters.

COMM 100A Situated Practice (4): A critical introduction to processes of interaction and engagement in lived and built environments. Includes historical survey of theories/methods, including actor network theory, conversation analysis, ethnography, ethnomethodology, cultural linguistics, performance, and social cognition; and integrates scholarly study with production-oriented engagement. Students will not receive credit for COHI 100 and COMM 100A. **Prerequisites:** COMM 10.

COMM 100B Interpretive Strategies (4): A critical introduction to the practice and the effects of representation within historically situated cultural contexts. Surveys a range of theories/methods in interpretations and identity to understand the effects of these practices upon the form and content of various representational genres, and integrates scholarly study with production-oriented engagement. Students will not receive credit for COCU 100 and COMM 100B. **Prerequisites:** COMM 10.

COMM 100C Social Formations (4): A critical introduction to structures of communication formed across the intersections of the state, economy, and civil society. Includes historical survey of communication industries, legal and policy-based arenas, civic and political organizations, and other social institutions; and integrates scholarly study with production-oriented engagement. Students will not receive credit for COSF 100 and COMM 100C. **Prerequisites:** COMM 10.

COMM 111D Critical Design/Intermediate Studio (4): Hands-on course that introduces students to design as political activity. Students work in groups to design an intervention into their own communities and think about how design plays a political role in our daily lives. Students ask how differently designed objects and environments help perpetuate or interrupt the status quo by examining examples from design, architecture, media activism, and everyday life. Students work on ambiguous problems, take and give feedback, and make and stage prototypes. May be taken for credit three times. **Prerequisites:** COMM 10 or COGS 1 or EDS 20 or ESYS 10 or POLI 10 or USP 1.

COMM 124A Critical Design Practice/Advanced Studio (4): Hands-on course introduces design as political activity. How will differently designed objects, environments perpetuate, interrupt status quo.
Examine design, architecture, media activism, workday life. Examine ambiguous problems, take and give feedback, create prototypes to engage communities, broader publics. Students see design as part of longer-term social transformations. **Prerequisites:** COMM 10 or COGS 1 or ESYS 10 or POLI 10 or POLI 10D or USP 1.

**COMM 124B Critical Design Practice/Topic Studio (4):** Course builds on understanding design as political activity. Group work to design quarter-long projects that explore political role of design, include design in built environments, organizations, media technologies. Deepened capacities to design in public, for publics, with publics. May be taken for credit three times. **Prerequisites:** COMM 124A.

**Computer Science and Engineering**

**CSE 110 Software Engineering (4):** Introduction to software development and engineering methods, including specification, design, implementation, testing, and process. An emphasis on team development, agile methods, and use of tools as IDE's, version control, and test harnesses.

**CSE 118 Ubiquitous Computing (4):** Explores emerging opportunities enabled by cheap sensors and networked computing devices, and is organized as a preparatory course for graduate school. Students read, present, and discuss research papers from the literature. Small research projects will be conducted in teams, culminating in project presentations at the end of the term. The weekly discussion section will cover material relevant to the project, such as research methods, software engineering, teamwork, and project management.

**Design**

**DSGN 1 Design of Everyday Things (4):** A project-based course examining how principles from cognitive science apply to the design of things simple (doors) and complex (new technology). Learn about affordances, constraints, mappings, and conceptual models. Learn observational and design skills. Become a human-centered design thinker.

**DSGN 100 Prototyping (4):** Explores cognitive principles of thinking through making. Introduces methods and tools for prototyping user experiences. Students make various prototypes and participate in weekly critique sessions. Topics: experience design, rapid prototyping, sketching, bodystorming, cardboard modeling, UI hacking, and design theory. **Prerequisites:** DSGN 1.

**DSGN 119 Design at Large (3):** New societal challenges, cultural values, and technological opportunities are changing design, and vice versa. The seminar explores this increased scale, real-world engagement, and disruptive impact. Invited speakers from UCSD and beyond share cutting-edge research on interaction, design, and learning. P/NP grades only. **Prerequisites:** upper-division standing.

**DSGN 160 Special Topics in Design (4):** Special topics in design. May be taken for credit three times when topics vary. **Prerequisites:** upper-division standing or consent of instructor.

**DSGN 195 Instructional Apprenticeship in Design (4):** Students, under the direction of the instructor, lead laboratory or discussion sections, attend lectures, and meet regularly with the instructor to help prepare course materials and grade papers and exams. P/NP grades only. May be taken for credit two times. **Prerequisites:** upper-division standing, 3.0 GPA, consent of instructor, and department approval.

**Engineering**
ENG 100D Design for Development (4): An introduction to the practice of human-centered design and team engineering within a humanitarian context. Includes a group project designing a solution for a local or global nonprofit organization. Topics include: design process, contextual listening, project management, needs and capacity assessment, stakeholder analysis, ethical issues, models of leadership, gender and cultural issues, sustainable community development, and social entrepreneurship. ENG 100D is the gateway course for the Global TIES program, but it is open to all undergraduate students. Please go to http://globalties.ucsd.edu for information about Global TIES. Recommended Preparation: one university-level mathematics course. Prerequisites: CAT 2 or DOC 2 or HUM 2 or MCWP 40 or MMW 2 or WCWP 10B.

ENG 100L Design for Development Lab (2): Faculty-directed, interdisciplinary, long-term humanitarian engineering, technology, and social innovation projects. Students work in teams to design, build, test, and deliver solutions to real-world problems experienced by nonprofit organizations and the communities they serve. ENG 100L is the laboratory course for the Global TIES program. Enrollment in this course is limited to students who have applied to and been accepted into the Global TIES program. Please go to http://globalties.ucsd.edu to apply to the program. May be taken for credit six times. Prerequisites: ENG 100 or ENG 100A, or ENG 100D. Department approval required.

Mechanical and Aerospace Engineering

MAE 3 Introduction to Engineering Graphics and Design (4): Introduction to design process through a hands-on design project performed in teams. Topics include problem identification, concept generation, project management, risk reduction. Engineering graphics and communication skills are introduced in the areas of: Computer-Aided Design (CAD), hand sketching, and technical communication. Prerequisites: grade of C– or better in Phys 2A or 4A. Priority enrollment given to engineering majors

Rady School of Management

MGT 103 Product Marketing and Management (4): Defining markets for products and services, segmenting these markets, and targeting critical customers within segments. Strategies to position products and services within segments. The critical role of pricing as well as market research, product management, promotion, selling, and customer support. Prerequisites: upper-division standing.


Psychology

PSYC 148 Psychology of Judgement and Decisions (4): This course provides an overview of judgment and decision making, which is broadly concerned with preferences, subjective probability, and how they are combined to arrive at decisions. History and current topics will be covered. Prerequisite: Upper-division standing.

PSYC 176 Creativity (4): This course provides an overview of how to foster creativity in individuals, groups, and organizations. Themes that cut across all three levels are highlighted. Prerequisite: Upper-division standing.

Visual Arts
VIS 30 Introduction to Speculative Design (4): Speculative design uses design methods to question and investigate material culture with critical creative purpose. This course provides a historical, theoretical, and methodological introduction to speculative design as a distinct program. Emphasis is tracing the integration of interdisciplinary intellectual and technical problems toward creative, unexpected propositions and prototypes.

VIS 100 Introduction to Public Culture (4): This course is about the expansion of contemporary visual arts practice into a field of environmental, architectural, and urban sites. It foregrounds public engagement and political inquiry, explores new forms of research and community-based knowledge production, and develops strategies for visualizing the dynamics of contemporary urban life. \textit{Prerequisites}: upper-division standing.

VIS 100A Design for Public Culture (4): This course will explore design strategies that engage today’s shifting public domain structures, situating the problematic of “the public” and the politics of public sphere as sites of investigation, and speculating new interfaces between individuals, collectives, and institutions in coproducing more critical and inclusive forms of public space and culture. \textit{Prerequisites}: VIS 100.

VIS 101A Design for Urban Ecologies (4): This course will explore design strategies that engage peoples’ shifting geopolitical boundaries, bioregional and ecosystems, urban structures and landscapes, and recontextualize the city as a site of investigation by developing new ways of intervening into expanded notions of urban space, including virtual communities and new speculations of urbanity. \textit{Prerequisites}: VIS 101.

VIS 148 Visualizing Art Practice (4): Artistic practice is a site of critical intervention. Through individual “Practice Diagrams,” students will visualize the issues, motivations, positions, and procedures that inspire and problematize their work, seeking to discover and mobilize new tools, spaces of research, and media experimentation. \textit{Prerequisites}: upper-division standing.

VIS 159 History of Art and Technology (4): Aims to provide historical context for computer arts by examining the interaction between the arts, media technologies, and sciences in different historical periods. Topics vary (e.g., Renaissance perspective, futurism and technology, and computer art of the 1950s and 1960s). Material fee required. \textit{Prerequisites}: upper-division standing.
APPENDIX C-V: OTHER GENERAL CAMPUS / HEALTH SCIENCES PUBLIC HEALTH RELATED COURSES

Anesthesiology

ANES 223 Intro/Politics of Medicine (4): Current legislative issues pertaining to medicine will be discussed. Students will learn how they can remain informed about these issues and how they can become personally involved in shaping public policy on health care. Speakers will include state legislators as well as recognized experts in the areas of health care, financing, residency training conditions and medical malpractice.

Anthropology / Biological Anthropology

ANSC 101 Aging: Culture and Health in Late Life Human Development (4): Examines aging as process of human development, from local and global perspectives. Focuses on the interrelationships of social, cultural, psychological, and health factors that shape the experience and well-being of aging populations. Students explore the challenges and wisdom of aging. Prerequisites: upper-division standing.

Bioengineering

BE 179A-D Bioengineering Capstone Design (1): This is series of courses required of graduating seniors in which student groups mentored by faculty and industry representatives focus on identifying an unmet medical need, developing a design project to address that need, and reduction to practice, where possible. The projects are presented in written reports, public discussions, poster sessions, and, in some cases, patent applications.

BENG 267 Microcirculation in Health and Disease (4): Structural and functional aspects of transport and blood-tissue exchange in key organs during circulatory shock, bacterial toxemia, and hypertension. Physical and ultrastructural techniques used to analyze small-vessel dynamics. Prerequisites: consent of instructor.

Biology

BILD 38 Dementia, Science, and Society and Aging (4): This undergraduate course is an introduction to basic human neuroscience leading to a discussion of brain diseases classified under the rubric Dementia. Topics include basic brain structure and function, diseases of the aging brain and their economic, social, political and ethical impacts on society.

Clinical Research

CLRE 252 Health Services Research (2): Scholars will evaluate relevant outcomes in patient-oriented research from the patient (quality of life) and societal (economic) perspectives and locate potential resources for assessing the relevant outcomes in a wide variety of study designs. They will also be able to describe the relative strengths of different health services research approaches to a clinical problem. Finally, they will understand the components of clinical practice guidelines, including patient preferences, and how these guidelines both depend upon as well as inform patient-oriented research. Class sessions may also be offered live via distance learning with established remote site.

Computer Science and Engineering
CSE 291 Healthcare Robotics (4): This graduate-level course will bring together engineers, scientists, clinicians, and end-users to explore this exciting new field. This course will be project-based, interactive, and hands on, and will involve working closely with key stakeholders to design and prototype.

Economics

ECON 152 Public Economics: Expenditures II (4): Overview of the public sector in the United States and the justifications for government intervention in economic life. Theory of income redistribution and social insurance. Applications to current policy in such areas as health insurance, welfare, unemployment insurance, and Social Security. Prerequisites: Econ 100C.

ECON 164 The Indian Economy (4): Survey of the Indian economy. Historical overview and perspective; political economy; democracy and development; economic growth; land, labor, and credit markets; poverty and inequality; health, education, and human development; technology and development; institutions and state capacity; contemporary policy issues and debates. Prerequisites: Econ 1 and 3.

Education Studies

EDS 381 Health Education (4): This course satisfies the Commission on Teacher Credentialing requirement for Health Education. Topics include: physical education, substance abuse, sex education, cardio-pulmonary resuscitation, nutrition, and first aid. Prerequisite: ED78 major: Elementary Multiple Subject or Single Subject candidates at UCSD who have advanced to student teaching or internship.

Global Policy and Strategy / Economics

GPEC 468 International Health Economics (4): Course provides an overview of health economics, focusing on developing countries. We will examine how standard economics concepts and methods can be used to understand incentives and decision making in health-related transactions and their application to health policy. Renumbered from IRGN 468. Students may not receive credit for GPEC 468, IRGN 468, and IRGN 490. International Health Economics.

Global Health

GLBH 20 Introduction to Global Health (4): Provides a foundational interdisciplinary understanding of complex global health issues and introduces major concepts and principles in global health. The course surveys the range of problems contributing to the global burden of disease and disability including infectious disease, mental illness, refugee and immigrant health, natural disasters, climate change, and food insecurity.

Health Law

HLAW 207A Principles in Health Law and Policy (4.5): The course offers a broad introduction to the legal aspects of American health care, through an in-depth analysis of selected contemporary issues at the intersection of health care and legal systems. It draws heavily on the experiences of the participants as well as the faculty. The course attends to how and why the law came to be (legal policy), how it is used (legal process), and how it affects the shape, cost, and quality of health care in America (legal impact). Part A emphasizes “private” law topics—the legal environment within which the private participants in
health care interact with each other. **Prerequisites**: admission to the MAS Health Policy and Law program or consent of department.

**HLAW 210 Applied Health Law and Policy (3)**: The course focuses on legal issues from the viewpoint of the administrator or chief clinical officer, including the patient record/HIT/HIPAA. The course gives emphasis to practical application and knowledge/skills to prepare the students for job search or career transition. **Prerequisites**: admission to MAS Health Policy and Law program, or consent of department.

**HLAW 212 Special Topics in Health Law (3)**: Given at the discretion of the faculty, topics of interest in health law will be presented for in-depth review and discussion by visiting or resident faculty members. The module will cover seminar topics related to health-care issues. May be taken for credit three times. **Prerequisites**: admission to MAS Health Policy and Law program or consent of department.

**HLAW 214 Independent Study in Health Policy & Law (1)**: In this course you will have the opportunity to take completed class projects that are of publishable quality and learn the entire publication process. You will be subject to instructor peer reviews of your work prior to submission, and then be guided through the submission and external peer review/law review process, including online systems, open access versus non-open access journals, submission targeting, and maximizing the use of research performed.

**HLAW 298 Directed Studies in Health Law (3)**: Faculty member will direct a student’s study in selected professional development topics in health law. Specific content will be tailored to the student’s particular needs and area of interest. Students must make arrangements with the program and individual faculty member prior to enrolling in the course each time. May be taken for credit three times. **Prerequisites**: admission to the MAS Health Policy and Law program or consent of department.

**HLAW 298A Health Law Research Forum (1)**: This course series focuses on developing students’ research and scholarly writing skills for their Independent Study Projects (ISP). Topics include refining the research question, collecting/analyzing data, understanding research methodology, forming the ISP committee, and producing a viable ISP proposal. **Prerequisites**: admission to MAS Health Policy and Law program or consent of instructor and courses have to be taken in order from A to C.

**HLAW 299 Independent Study Project in Health Law (3)**: Students will be involved in a high-level applied research project. The project will cover an area of health law related to topics covered in the formal curriculum. Students’ work will be evaluated by a committee of faculty and may include industry advisors when appropriate. **Prerequisites**: HLAW 298A-C; admission to MAS Health Policy and Law program or consent of instructor.

**History**

**HILD 30 History of Public Health (4)**: Explores the history of public health, from the plague hospitals of Renaissance Italy to the current and future prospects for global health initiatives, emphasizing the complex biological, cultural, and social dimensions of health, sickness, and medicine across time and space.

**Leadership / Health Care Organizations**

**LHCO 201C Topics in Healthcare Management and Innovation (1)**: Weekly discussions with healthcare entrepreneurs and managers will expose students to real life experiences. How are solutions to healthcare delivery identified and implemented? How are solutions brought to the marketplace?
LHCO 298 Independent Study Project in the Management of Health Care (4): The Independent Study Project (ISP) is the cornerstone of the MAS Program. Students will be involved in a high-level applied research project that integrates what they have learned in their formal course work. The ISP will be an independent and creative scholarly activity in an area related to one or more of the topics covered in the formal curriculum. Students’ work will be evaluated by a committee consisting of faculty and, when appropriate, industry advisors.

Literature of the World

LTWL 176 Literature and Ideas "What is Healthy Aging?" (4): This undergraduate course examines a range of texts that explore aging in science and technology, social sciences, literature and film, students will have the opportunity to explore the importance of culture in research and science careers in the field of healthy aging.

Rady School of Management

MGT 454 Disruptive Technologies for Health Care (4): Introduces how IT will transform health sciences. Highlights how IT and associated disruptive innovations in health-care delivery will enable physicians, patients, and caregivers to cost effectively prevent, diagnose, and monitor health conditions; manage treatment; and facilitate timely communication and intervention. Letter grades only. Students may not earn credit for both MGT 454 and MGT 274. They are course equivalents. Prerequisites: admission to MBA program or consent of instructor.

Comparative Politics

PS 125A Communities and the Environment (4): A popular new idea in environmental protection is to include local communities in conservation efforts. But what are these communities? What challenges do they face in governing their own resources? This course uses both theory and case studies to explore the political economy of community-based conservation.


Reproductive Medicine

RMED 429 Subinternship in Family Planning and Women’s Reproductive Health: On this subinternship students will see patients presenting for the full spectrum of family planning and basic gynecologic care. Students will participate in evaluating patients presenting for early pregnancy assessment to include pregnancy termination, miscarriage, and pregnancy options counseling. Students will also see patients presenting for contraception, screening and treatment for sexually transmitted infection, vaginitis, and cervical and breast cancer screening and will also learn examination and microscopy skills necessary to diagnose vaginitis. Students will also observe or participate in placement of intrauterine devices and contraceptive implants, outpatient surgical procedures and colposcopy. During the 4 week course, students will be expected to function as a sub-intern. The course is primarily outpatient, however for the interested student, overnight call may be arranged.

Sociology
SOCl 40 Sociology of Health-Care Issues (4): Designed as a broad introduction to medicine as a social institution and its relationship to other institutions as well as its relation to society. It will make use of both micro and macro sociological work in this area and introduce students to sociological perspectives of contemporary health-care issues. Will not receive credit for SOCl 40 and SOCL 40.

School of Medicine Interdisciplinary

SOMI 235 Healthy Minds, Healthy Bodies (4): Students will be trained to give ten lessons on health topics to the same high school/middle school class providing a longitudinal health curriculum. They will learn teaching strategies, receive video and written feedback, track student learning and act as role models.

Pharmacy

SPPS 204 Law and Ethics (4): This class provides an introduction to the legal and ethical practice of pharmacy. It includes lectures about concepts of pharmacy law, reading assignments, posed ethical dilemmas and student learning groups.

SPPS 206 Biostatistics (4): This course explores biostatistics concepts, statistical tests, and appropriate application of statistical methods relevant to pharmacy and medicine. Students learn to manipulate data sets, analyze pharmaceutical data, and understand the application and interpretation of statistical analyses.

SPPS 207 Introduction to Health Care Systems and Policy (4): Students are introduced to the organization, financing and delivery of health care services in the United States. Using access to prescription drugs as one framework, the relationship of providers, patients, payers, producers, purchasers and policy makers will be analyzed as a critical review of the systems assets and liabilities. In addition, discussions will include other comparisons of other national health policies and current United States health policy issues and controversies.

SPPS 209 Applied Pharmacoconomics (4): This course is an introduction to principles utilized to manage drug therapy for patient populations to produce quality clinical, economic and humanistic outcomes in a cost-effective manner.

SPPS 219 Pharmacogenomics (4): This course provides a foundation in pharmacogenomics and pharmacogenetics as they apply to personalized medicine and clinical practice.

SPPS 286 Special Topics in Psychiatry (4): This course focuses on mental health disorders and dispelling the myths and stigma associated with such disorders.

SPPS 297 Current Concepts in Pharmacy Legislation (4): Special Studies

Urban Studies and Planning

USP 143 The US Health-Care System (4): This course will provide an overview of the organization of health care within the context of the community with emphasis on the political, social, and cultural influences. It is concerned with the structure, objectives, and trends of major health and health-related programs in the United States to include sponsorship, financing, training and utilization of health personnel. Prerequisites: upper-division standing or consent of instructor.
APPENDIX C-VI: PUBLIC HEALTH RELATED CURRICULAR ACTIVITIES AT UC San Diego SCHOOL OF MEDICINE FOR MEDICAL STUDENTS

A significant proportion of UCSD Medical students pursue a combined MD/MPH every year. The numbers of MD/MPH graduates for the past 4 years are: 2014 (9), 2015 (13), 2016 (9), 2017 (10), and current fourth year students who will complete the MD/MPH in 2018 (9). While most UCSD Medical students obtain their masters training away from San Diego at Harvard, Hopkins, UC Berkeley, or Columbia; of the 50 students listed above, 5 were locally trained, attending SDSU for their MPH.

Masters level training is also elected by a subset of our medical students who enter our Program in Medical Education- Health Equity (PRIME-HEq). The program is part of a system-wide effort at the University of California to train physicians better able to meet the needs of the diverse California population who are traditionally underserved by the medical system. In addition, and directly relevant to Public Health (The Lancet 375:535-537 (2010)), 5-7 medical students annually choose an academic concentration in Global Health. For this they are supported for an away research project during summer between years 1 and 2. They learn first-hand about the complexities and challenges of global healthcare delivery, ethics, and the socio-structural bases of health inequities. Some, few, obtain an MS in Global Health.

In the School of Medicine’s curriculum there are many points of educational engagement with public health issues in the core courses. The following list examples:

- In the first year course, Microbiology, differences in geography, age and ethnicity of the microbiome are covered.
- In the second year course, Epidemiology, Biostatistics, and Medical Informatics (EBMI), types of population studies and study designs are taught.
- The second year course, Pulmonary System II, teaches about groups at risk for hypercapnia/OSA, smoking, obesity.
- The second year course, Arthritis, Rheumatology and Dermatology Disorders (ARDD), explains the geography and pathophysiology of vector-borne diseases, and the prevalence of rheumatic disorders across socioeconomic groups, ethnic groups and gender.
- The second year course, Multi-Organ System Disorders, covers Homeland Security systems positioned to respond to public health emergencies.
- The fourth year course, Principles to Practice, covers public health practices, the healthcare system, and disparities in access to health care.

The School of Medicine electives that cover public health:

FPM 220 Local Health Policy & Advocacy Related to Underserved Communities (4)

FPM 232 Perinatal epidemiology (4)

FPM 241 Aging: Social and health Policy Issues (4)

FPM 244 Clinical and Public Health Elective, Baja California, Mexico (2): Integrated clinical and public health experience with U.S. and Mexican graduate student and faculty teams over three to four days in Baja California, Mexico; emphasis on common clinical and public health problems in underserved populations. Minimal working knowledge of Spanish recommended. May be taken for credit four times.
Prerequisites: UC San Diego School of Medicine student and graduate students with consent of instructor.

FPM 245 Essentials of Global Health (2): The sociocultural, economic, and geo-political framework for the study and understanding of medical problems on a worldwide scale, and as basis for international health policy is presented. Using global patterns of disease, availability and needs for medical technology, and comparisons between diverse medical education and health care delivery systems abroad with those in the United States, students should be able to acquire an understanding of diverse determinants of disease and of relationships between socioeconomic development and health. Prerequisite: Medical or graduate student; senior-level undergraduate students by special permission

FPM 252 Problems in Global Health (4)

MED 239 Health Frontiers in Tijuana (4): Health Frontiers in Tijuana is a new elective where UCSD Medical students will learn about many of the joys and challenges of community medicine and healthcare of the underserved in Mexico becoming an active participant in the student-run Health Frontiers in Tijuana free-clinic project. Students enrolled in this course will learn about the Mexican Health Care Systems, community partners in Tijuana and will play various roles under faculty supervision, including that of binational health care provider, community advocate, health educator, clinic administrator and global public health researcher. Prerequisite: 1st or 2nd year Medical Students

MED 254 Healthcare Systems: A Quantitative Perspective (4)

MED 272 Population Health Informatics (4): This course provides training in both the methods and applications of public health informatics. Foundational methods such as geographic information systems, epidemiology, and syndrome classification are reviewed, as well as emerging methods such as social network analysis. The methods are situated within the context of important contemporary applications such as public health surveillance, behavioral health, social network outbreak characterization, and global health informatics.

SOMI 248 Introduction to Global Health Research (4)
## APPENDIX D: FACULTY PURSUING A PRIMARY OR JOINT APPOINTMENT IN THE SCHOOL OF PUBLIC HEALTH

Current Health Sciences Faculty with Public Health Interests

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<tr>
<th>Last Name</th>
<th>First Name</th>
<th>Degree</th>
<th>Working Title</th>
<th>Home Dept.</th>
<th>Joint Appt. / Affiliation Dept.</th>
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<td>Albani</td>
<td>Salvatore</td>
<td>MD, PhD</td>
<td>Professor</td>
<td>Pediatrics</td>
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<tr>
<td>Al-Delaimy</td>
<td>Wael</td>
<td>MD, PhD</td>
<td>Professor &amp; Division Chief (Global Health)</td>
<td>FMPH</td>
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<tr>
<td>Aldana</td>
<td>Nancy</td>
<td>MD</td>
<td>Clinical Instructor</td>
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<tr>
<td>Aldo</td>
<td>Michael</td>
<td>MD</td>
<td>Professor &amp; Vice Chair</td>
<td>Urology</td>
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<tr>
<td>Ali</td>
<td>Sameh</td>
<td>PhD</td>
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<tr>
<td>Allison</td>
<td>Matthew</td>
<td>MD, MPH</td>
<td>Professor &amp; Division Chief (Preventive Medicine)</td>
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<td>Almutairi</td>
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<td>Amiel</td>
<td>David</td>
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<td>Ancoli-Israel</td>
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<td>Anderson</td>
<td>Cheryl</td>
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<td>Araneta</td>
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<td>Averbacj</td>
<td>Sarah</td>
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<td>Barrett-Connor</td>
<td>Elizabeth</td>
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FMPH: Family Medicine and Public Health  
GPH: Medicine: Global Public Health  
SIO: Scripps Institution of Oceanography  
SSPPS: Skaggs School of Pharmacy and Pharmaceutical Science
### Additional Current General Campus Faculty with Public Health Interests

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GPS: School of Global Policy & Strategy  
Rady: Rady School of Management  
SIO: Scripps Institution of Oceanography
APPENDIX E: CENTERS AT UC SAN DIEGO RELEVANT TO PUBLIC HEALTH

Aging

Stein Institute for Research on Aging

In 1983 the Stein Institute was established with a long term goal to promote interdisciplinary programs concerning the basic biology of senescence, the role of free radicals and other environmental toxins in the aging process, and the pathophysiology of age-related illnesses such as Alzheimer's disease, arthritis, atherosclerosis, and cancer. In addition to supporting research, the Institute was organized to foster training and education in geriatrics and gerontology. The Stein Institute has brought together a critical mass of scientific talent, encouraged and funded age-related research, purchased needed scientific equipment, supported the education of more than 150 students, and provided over 300 public lectures on aging as part of its general community outreach. The Stein Institute for Research on Aging is advancing aging research by conducting basic and clinical research, enhancing collaboration and attracting new researchers to the field - all with the ultimate objective of helping more people age successfully.

Within the Stein Institute for Research on Aging, the Healthy Aging Institute was established as a cross campus initiative with the goal of breaking the traditional silos that occur within academic departments and bring faculty and trainees from varied disciplines, departments, and professional backgrounds to work collaboratively on various aspects of healthy aging. The initiative is comprised of four schools: Medicine, Engineering, Pharmacy, and Management; four campus divisions: Biological, Social, Physical Science, and Arts & Humanities; and four ORUs: Qualcomm, Engineering in Medicine, Kavil, and Stein.

Center for Healthy Aging

Center for Health Aging (CHA) is an umbrella organization for all aging-related programs at UCSD and expands upon the work of the Stein Institute for Research on Aging. The focus of CHA extends beyond medical research to address the major challenges facing our society as it prepares to accommodate a rapid expanding demographic of older adults – In terms of technology, finances, housing, transportation, and urban planning.

Additional Information can be viewed on their website at:
https://healthsciences.ucsd.edu/research/aging/Pages/default.aspx

Center for Life Course Research at the Altman Clinical and Translational Research Institute

The Center for Life Course Research was established in 2015 to incorporate special populations and all age groups into research. This integrated program provides a unique multi-disciplinary opportunity to bring pediatricians, neonatologist, internist, family medicine physicians and geriatrics specialist together to study special populations and life course transitions. Broadly, the center investigates the long term social, behavioral, and biological determinants of disease across the life span of across generations. Through these studies researchers strive to elucidate the origins and trajectories of disease. Through multi-disciplinary collaborations, clinical researchers seek to bridge developmental transitions throughout the life course, enabling a continuum of care and investigation into biologic plasticity, fetal programming, and critical periods of growth and development.

Additional Information can be viewed on their website at:
https://actri.ucsd.edu/clinical/Pages/CenterforLifeCourseResearch.aspx
**Big Data**

**Supercomputer Center**

UCSD Organized Research Unit (ORU), the San Diego Supercomputer Center (SDSC) is a leader in advanced computation and all aspects of “Big Data”, which includes data integration and storage, performance modeling, data mining and predictive analytics, software development, and more. SDSC provides resources, services, and expertise to the national research community including academia, industry, and government. SDSC supports hundreds of multidisciplinary programs spanning a wide variety of domains, from astrophysics and bioinformatics to environmental sciences and health IT. SDSC offers a variety of research computing cyberinfrastructure resources, services, and expertise. The SDSC datacenter houses a wide range of computational resources, and continues to make leading-edge resources available to UCSD, University of California and our partner institutions. SDSC Services include high performance computing, data science solutions, IT services, and business services.

Additional Information can be viewed on their website at: [http://www.sdsc.edu/](http://www.sdsc.edu/)

**Environment and Health**

**Scripps Center for Oceans and Human Health**

Scripps Center for Ocean and Human Health (SCOHH) is a center within the Scripps Institution of Oceanography. SCOHH was established with the goal to characterize the biological sources, distributions, chemical composition, biosynthetic mechanisms, exposure and toxicity of the natural, polybrominated and mixed halogenated organic compounds that are accumulating globally in marine mammals, fish, and shellfish, and also shown to be present in human breast milk.

SCOHH is structured into three highly collaborative and integrated Projects (P1, P2 and P3) involving six independent scientists and their collaborators. This configuration is organized around the central themes of the Center, which is to discover the main marine sources and sinks of natural polybrominated organic compounds (P1), the molecular basis of polybrominated organic compound biosynthesis in the marine environment (P2), and the distribution, provenance, and human health implications of marine polybrominated organic compounds (P3). These three Projects pair investigators with complementary expertise and with a history of collaborative research to tackle for the first time in a systematic fashion the origin and marine food web distribution of polybrominated HOCs of human health concern.

Additional Information can be viewed on their website at: [https://scripps.ucsd.edu/scohh](https://scripps.ucsd.edu/scohh)

**Global Health**

**Global Health Institute**

USCD’s GHI is a UCSD campus-wide effort that aims to coordinate existing global health research and training efforts across the campus, and to generate new collaborations and educational programs to meet health challenges of global importance. The goal of the GHI is to serve as a resource for coordinating UCSD global health projects, courses, research, and training programs for the local global health community. The mission of UCSD’s GHI is to facilitate research, education and public/private partnerships across diverse disciplines to address global health challenges of the 21st century, and to serve as a coordinating body for training programs, service and global health related curricula. The GHI’s themes of focus include Global Infectious Disease, Global Health Technologies, and Global Mental Health.
Health and Education Disparities

The Center for Investigations of Health and Education Disparities

Established in 2012, the Center for Investigations of Health and Education Disparities (CIHED) is a collaborative effort between UCSD researchers, educators, scholars, and community leaders within the San Diego area. Through Research, Training, and Outreach, CIHED and its partners hope to find practical interventions to reduce the health and educational gaps between ethnic and socioeconomic groups in the United States. The CIHED is a campus-wide initiative aimed at accomplishing the following ten goals:

1. Establish multi-disciplinary collaborations among faculty and research groups at UCSD currently interested in health and education disparities.
2. Promote and encourage other faculty members at UCSD to focus on research in health and educational disparities.
3. Establish UCSD as a major center of excellence for health and educational disparities research in the US.
4. Become a resource for information about health and educational disparities for the community and disseminate information regarding the causes and solutions for health and educational disparities in America.
5. Motivate, mentor, and train the next generation of ethnically-diverse physicians, educators, biomedical, and social scientists.
6. Educate UCSD students on different aspects of health and educational disparities and provide them with the abilities to communicate this knowledge to the general public.
7. Build a program to improve K-12 science education directed at cultivating students with 21st century skills.
8. Formulate a strategy to motivate, recruit, and facilitate access to higher education for students from disadvantaged social and economic backgrounds and those with disabilities.
9. Create an outreach program to promote access of the San Diego community to healthcare services, health and prevention education, and pathways to robust opportunities for scholastic and employment development in the health sciences.
10. Build an efficient communication system between scientists and health professionals and the education community through innovative media, events and curriculum.

Residing within CIHED is The Antonio De Maio Laboratory, aimed to investigate the molecular and genetic bases of the response to injury; traumatic injury is a major cause of mortality and morbidity in the United States. Current De Maio research/projects include:

- The systematic response to injury (Finding: Response to injury is modulated by several confounding factors including genetic background, sex, age, diet, and environment)
- Extracellular heat shock proteins (Finding: Hsp70 (major inducible form of heat short protein family) secretion is initiated by the translocation of the protein into the plasma membrane followed by the released within vesicles)
- Motivating, Mentoring, and Training (Training: Undergraduate, graduate, medical students, and Post-docs, particularly students from disadvantaged social and economic backgrounds, students with disabilities, and students from minority groups that are under-represented in science)
Healthcare Systems

UC San Diego Health

UCSD Health is dedicated to the highest quality patient-centered primary and specialty care. UCSD Health is the region's only academic medical center and have a tripartite mission of clinical, research and teaching excellence. UCSD Health offers unparalleled subspecialty expertise and innovation to patients whose medical issues are beyond the scope of traditional community hospitals. UCSD Health is one of five academic medical centers within the 10-campus University of California system. Collectively known as UC Health, these medical centers comprise the fourth largest health care delivery system in California and train nearly 50 percent of the state’s medical students and medical residents.

The mission of UCSD Health is to deliver outstanding patient care through commitment to the community, groundbreaking research and inspired teaching; their vision is to create a healthier world — one life at a time — through new science, new medicine and new cures. To fulfill their mission, UCSD Health currently maintains a two-campus strategy, integrating research, teaching and clinical care at locations in Hillcrest and La Jolla. Each medical complex supports acute in-patient care and a spectrum of outpatient primary and specialty medical and surgical services, including ambulatory and emergency patient care.

Additional Information can be viewed on their website at: https://health.ucsd.edu/Pages/default.aspx

Veterans Health Administration

Veterans Health Administration (VHA) operates is one of the largest integrated health care systems in the world and provides training for a majority of America’s medical, nursing and allied health professionals. Roughly 60 percent of all medical residents obtain a portion of their training at VA hospitals; and VA medical research programs benefit society at-large. The VHA provides care at 1,245 health care facilities, including 170 VA Medical Centers and 1,065 outpatient sites of care of varying complexity (outpatient clinics), serving more than 9 million enrolled Veterans each year. The mission of the VHA is to honor American’s Veteran’s by providing exceptional health care that improves their health and well-being. VHA vision is to continue to be the benchmark of excellence and value in health care and benefits by providing exemplary services that are both patient centered and evidence based; care will be delivered by engaged, collaborative teams in an integrated environment that supports learning, discovery and continuous improvement; emphasize prevention and population health and contribute to the nation's well-being through education, research and service in National emergencies.

VHA Medical Centers provide a wide range of services including traditional hospital-based services such as surgery, critical care, mental health, orthopedics, pharmacy, radiology and physical therapy. In addition, most of our medical centers offer additional medical and surgical specialty services including audiology & speech pathology, dermatology, dental, geriatrics, neurology, oncology, podiatry, prosthetics, urology, and vision care. Some medical centers also offer advanced services such as organ transplants and plastic surgery.

Additional Information can be viewed on their website at: https://www.va.gov/

Policy Design and Evaluation Lab

The Policy Design and Evaluation Lab (PDEL) is an international focal point for rigorous empirical research on the interplay of public policy, technology, and economic development located within UCSD’s School of Global Policy and Strategy. PDEL combines advanced social science methodology with the
power of information technology to design policies and programs that alleviate poverty promote health, welfare, and security; and enhance accountability. PDEL uses multidisciplinary collaboration within applied social science, information and communication technology, health sciences, and environmental sciences. Current Public Health related focus areas include: Climate Change and Human Health, Mobile Phone-Bases Pulse Oximeter, Consanguineous Marriage and Intimate Partner Violence, Using Big Data and Experiments to Solve the Last-Mile in Polio Vaccinations

Additional Information can be viewed on their website at: http://pdel.ucsd.edu/

Technology

Center for Wireless and Population Health Systems

The Center for Wireless and Population Health Systems, a collaboration between Health Sciences and the Qualcomm Institute (QI) of the California Institute for Telecommunications and Technology (Calit2) focuses on how the health of individuals, families, communities, social networks, and populations can be improved through the creative use of wireless and networked technologies and ubiquitous computing. Parallel efforts also study how to promote health and prevent disease and disability through systems-level interventions in clinical and community settings.

CWPHS researchers and collaborators come from the UCSD School of Medicine, UCSD’s Division of Social Sciences, the Jacobs School of Engineering, the San Diego Supercomputer Center and San Diego State University. Included are scientists with backgrounds in clinical and preventive medicine, computer science and engineering, social networks, political science, clinical and experimental psychology, electrical engineering, health behavior, systems science, behavioral genetics, exercise and nutrition science, public health, and evolutionary biology. Health issues addressed in recent research have included pediatric and adult obesity and their comorbidities, depression, improving outcomes in cancer survivors, successful aging, the use of games to promote improved health behaviors, and the dynamics of health-related states within social networks.

Additional Information can be viewed on their website at: http://cwphs.ucsd.edu/

Center for Wearable Sensors

The Center for Wearable Sensors based at QI is just one example of the use of technology for public health impact. The Center offers state-of-the-science research, development, consultation and direct assessment of physical activity and health-related fitness including cardiorespiratory, metabolic, neuromuscular, skeletal, and cognitive health. They also develop, implement, and evaluate interventions for both apparently healthy and clinical populations across the age continuum.

Additional Information can be viewed on their website at: http://jacobsschool.ucsd.edu/wearablesensors/

Design Lab

The Design Lab model practices people-centered design as a way of thinking and addressing complex sociotechnical systems, always focusing upon the needs and capabilities of the people. Health is the largest research topic in the Design Lab – not just treatment, but prevention. Current Health Sciences partners include Family Medicine and Public Health, Radiation Oncology, Emergency medicine, Radiology, Pediatrics and Infectious Disease. Courses are in place through an undergraduate minor (DSGN) that will help public health students to see that they are at the interface between people, organizations, society and technology, and planning is underway for a PhD specialization.
The Design Lab approaches problems through observation, spending time in the field, attempting to understand the needs and to address and solve the fundamental, core issues. Observation is followed by ideation and then the development of simple prototypes that allow testing of our ideas. The Lab starts with prototypes that can be constructed in hours or days, often simply hints of what is desired, asking people to imagine they are working systems. Successive testing and refinement allows closer and closer approximation to working systems.

Additional Information can be viewed on their website at: http://designlab.ucsd.edu/

Institute of Engineering in Medicine

The Institute of Engineering in Medicine (IEM) has over 130 outstanding faculty from UCSD’s Schools of Medicine, Skaggs School of Pharmacy & Pharmaceutical Sciences, and Jacobs School of Engineering, all sharing the objective of translating creative ideas into clinical medicine and novel products that will transform patient care and improve the health and well-being. IEM was established at UCSD as an Organized Research Unit in July 2008. It has made excellent progress during the first year of operation due to the superb efforts of the faculty, students and staff, and the strong support by the administration and industry partners.

Research Overview

With the cooperation of the Jacobs School of Engineering and UCSD Health Sciences, UCSD formed the Institute for Engineering in Medicine in 2008 for the integration of engineering principles and novel technologies with biomedical research and clinical translation. The key technology areas include imaging, systems biology, medical devices, nanotechnology, biomaterials, tissue engineering, biophotonics, and vaccine engineering. One example is a subcutaneous microdevice that provides continuous glucose monitoring in diabetes and automatically adjusts insulin dosage. The IEM partners with the von Liebig Center for Entrepreneurism and Technology Advancement for technology transfer and commercialization and with the Clinical Translational and Research Institute (CTRI) for the translation of its innovative discoveries to clinical application.

Research in the Institute of Engineering in Medicine focuses on the convergence of disease, technology, and sciences by applying an engineering approach to medicine. The disease focus areas include cancer, cardiovascular diseases, metabolic disorders, musculoskeletal diseases and neurodegenerative diseases, as well as perinatal health.

The IEM establishes new frontiers for research in healthcare by interfacing engineering and biomedical sciences using the team science approach to advance precision medicine. With active involvement of industry partners and clinical colleagues, the technologies developed in the IEM are transferred to healthcare delivery to enhance the health and wellbeing of people.

IEM research labs work to develop novel methods for the prevention, diagnosis, and treatment of important diseases and injuries; including cancer and cardiovascular, metabolic, neurological, ophthalmological, and orthopaedic diseases.

Centers

Biomaterials and Tissue Engineering Center

The mission of the Biomaterials and Tissue Engineering Center (BMTEC) is to synergize the expertise in biomaterials, bioprinting, cell and developmental biology, and medical research in the San Diego community and to translate it for clinical applications. Given its multiscale and multidisciplinary nature,
tissue engineering can benefit immensely from collaboration between Engineering, Physical Sciences, and the Health Sciences. UCSD has a strong team of faculty with expertise in tissue engineering and stem cell in the Jacobs School of Engineering, the School of Medicine, Division of Biological Sciences, and Skaggs School of Pharmacy and Pharmaceutical Sciences. BMTEC expertise covers a variety of tissues such as bone, cartilage, muscle, neuron, cardiac, liver, kidney, eye, and brain using various biomaterials. The BMTEC investigators have a unique capability in addressing the lengthscale issues of tissue growth from nanometer to micrometer and organ scale using novel biomaterials and bioprinting techniques. BMTEC also have the expertise to investigate the timescale issues in tissue engineering using time-resolved sensing and imaging techniques. Biomechanics issues involved in various cell and tissue types are also important research topics at BMTEC. BMTEC emphasize translational research so that fundamental knowledge in tissue science and engineering can be applied to clinical problems.

**Biophotonics Technology Center**

The primary focus of the Biophotonics Technology Center (BTC) is to foster research collaboration amongst its members, as well with non-member faculty who collaborate with a BTC member. The translation to the private sector of discoveries made by member of the BTC is also a major objective. Several mechanisms are used to achieve these goals.

First, the BTC will provide funding for innovative pilot projects that are too early to garner funding from conventional venues (government, foundations, industry, etc.). These “spark” awards will be in the range of $50K-100K/year direct costs for one or two years. It is anticipated that 2-4 awards can be made each year. The funds can be used for graduate student and postdoctoral fellow support, but not for faculty salaries. The type of projects funded will generally deal with mechanisms of photon interaction with biological systems, the use of photons to manipulate cells and or tissues, and the application of photons in clinical diagnostic or therapeutics systems.

Second, to foster collaboration and interchange, there will be an annual one-day symposium devoted to oral presentations in the field of biophotonics. The speakers will be a mix of internal (UCSD) and external presenters from industry and other San Diego area research institutions. The intention of the symposium is to foster collaboration.

Third, mechanisms to foster collaboration will unfold with the success of the BTC program and will be in the form of either program project grants, IGERT awards, or grants from agencies where multidisciplinary collaboration is emphasized.

**Center for Advanced Neurological Engineering**

The mission of the Center for Advanced Neurological Engineering (CANE) is to integrate the abundant expertise in neural engineering and computation at UCSD with basic scientific and clinical knowledge of the nervous system to improve the diagnosis, treatment, and prevention of neurological diseases and injuries. The center will characterize and clarify neuropathogenic processes, create and apply innovative technologies for advanced neuroscience research, and develop novel methods and strategies to create new ways for improving the lives of patients with neurological disorders.

The center focuses on novel approaches to recording and modeling brain activities and body functions, including the combination of electroencephalographic, electromyographic, behavioral, and physiological measures. Emerging microelectronic technologies will be used to develop human noninvasive, high-density, multimodal, mobile brain/body imaging and analyses, and implantable applications of closed-loop systems. The center will enable wireless transmission of a patient’s health status and their needs to
health providers to enable noninvasive, personalized remote health care, real time, high-content phenotyping, and longitudinal follow-up.

The center also develops and applies advanced computational approaches to analyzing the flow of information, and create smart databases interfaced with online data mining, allowing the translation of advances in neuroscience into health care in the clinic, the workplace, and the home. Advanced statistical methods, including independent component analysis, will be employed to enable high-throughput feedback to the subject and a reduction of health care costs. These approaches facilitate diagnosis, monitoring of treatment efficacy, and prediction of outcome for neurological diseases such as Parkinson’s disease, Alzheimer disease, Huntington disease, Down syndrome, Lou Gehrig’s disease, cerebral palsy, sleep disorders, stroke, traumatic brain injury, etc. The center creates a first-in-class effort for understanding and treating the nervous system to improve the lives of individuals afflicted with neurological diseases.

**Cardiac Biomedical Science and Engineering Center**

The mission of the Cardiac Biomedical Science and Engineering Center (CBSEC) is to synergize the expertise in cardiac research and its translation at UCSD and neighboring institutions, in order to combat heart diseases.

**Center for Engineering in Cancer**

The Center for Engineering in Cancer (CEC) works closely with the Moores Cancer Center to bring together researchers across different disciplines, including engineering, cancer biology, stem cell biology, basic medical science and clinical medicine to foster new collaborations focusing on the integration of engineering principles and technology with cancer medicine. The Center will develop and apply novel approaches in biomedical imaging, genetic and epigenetic engineering, molecular, cellular and tissue engineering, advanced biomaterials and nanobiotechnology, systems biology and medicine, and medical devices to advance prevention, early detection, diagnosis, and treatment of cancer.

The CEC will emphasize translational research involving collaboration with clinical colleagues and industry and will create a conduit for graduate students to be trained in multiple laboratories, broadening the areas of their expertise.

**Center for Engineering in Diabetes**

The goals of the Center for Engineering in Diabetes (CED) are to stimulate research, development and clinical translation of new technologies for the treatment of diabetes. The CED facilitates interdisciplinary collaborations between clinicians, engineers, research scientists, and industry, as well as train a new professional workforce of student graduates with specialized engineering skills and clinical perspectives to work hand-in-hand with clinicians and the medical device industry.

**Center for Medical Device Technology**

The mission of the Center for Medical Device Technology (CMDI) is to achieve interdisciplinary innovation to design personalized, intelligent biodevices, especially microdevices. These engineered microdevices will revolutionize current medical protocols and play a central role in bringing about a decentralized paradigm shift for the benefits of patients and the nation as a whole.

The principal aims of the CMDI are to 1) foster synergistic collaborations in the area of medical devices and instrumentation among faculty members currently in various departments in the School of Medicine and the Jacobs School of Engineering, 2) facilitate the incubation of novel concepts and ideas and to
catalyze the technology transfer and commercialization of UCSD inventions in the area of medical devices, 3) establish strategic partnerships with the industrial sector for the development of novel ideas and concepts in medical devices and instrumentation, and 4) satisfy the currently unmet demand for the education of students and the continuous training of scientists and engineers in the growing medical devices industry.

Center for Multiscale Imaging of Living Systems

Multiscale imaging of living systems from the atomic to the molecular, cellular, tissue, organ and whole organism level is essential for mechanistic in vivo research, biomarker discovery and applications, medical practice, and personalized medicine. UCSD, The Scripps Research Institute, the Salk Institute for Biological Sciences, the Sanford-Burnham Institute and the La Jolla Institute of Allergy and Immunology, as well as other research groups in La Jolla have developed significant capabilities in this area. The Center for Multiscale Imaging of Living Systems (CMILS) is organized under the auspices of the Institute of Engineering in Medicine with the goal of expediting the development and application of new imaging methods, promoting interdisciplinary research and applications for funding, and to foster industry-academia relationships in the area of multiscale imaging.

Center for Mobile-health Systems and Applications

The mission of Center for Mobile-health Systems and Applications (CMSA) is to advance the use of mobile technologies for medical, behavioral, social and public health research and promote collaboration among Institutes and ORUs in the Jacobs School of Engineering, the School of Medicine and the general UCSD campus, as well as Centers in the IEM. CMSA will focus on systems-level approaches to health and healthcare where multiple levels and types of expertise in addition to engineering and medicine are involved, including qualitative, quantitative and mixed-methods research about how people use and benefit from mobile technologies. CMSA will develop and support a cadre of research-ready clinicians, behavioral, social and public health scientists at UCSD and Rady Children’s Hospital who conduct clinical trials and other studies that are based in part or in whole on the application of mobile technologies in health.

Center for Musculoskeletal Research

The mission of the IEM Center for Musculoskeletal Research (CMSR) is to synergize the expertise in musculoskeletal research within the San Diego community and to translate it into improved treatment of musculoskeletal diseases. The CMSR will bring together scientists, engineers, and clinicians in the UCSD Jacobs School of Engineering, UCSD Health Sciences, neighboring research institutes and industry to elucidate mechanisms of pathogenesis of musculoskeletal disease, create innovative technology for cutting-edge musculoskeletal research, and develop novel strategies to improve diagnosis, treatment and prevention of musculoskeletal diseases. The CMSR has an excellent cross-Departmental structure, with members from UCSD Departments of Bioengineering, Medicine, Orthopaedic Surgery, Radiology, and Surgery, as well as neighboring institutions; these members have a track record of strong interdisciplinary collaboration in musculoskeletal science, engineering and diseases. This Center harnesses the multitude of strengths that exist on the La Jolla Mesa and provides a synergistic and entrepreneurial environment for creating new knowledge and solving challenging problems.

Center of Excellence for Nano-Medicine and Engineering

The Center of Excellence for Nano-Medicine and Engineering (CNME) aims to use responsive and smart materials, nanotechnology, and molecular engineering to transform biological research and medicine. Currently, CNME research can be categorized into five areas: Drug delivery, next-generation imaging agents, portable diagnostics, tissue engineering, and in vivo generation.
**Center for Perinatal Health**

The mission of the Center for Perinatal Health (CPH) is to advance newborn health by designing novel technologies customized to materno-fetal and newborn physiology. The CPH is a unique collaboration between physicians, engineers and scientists in which the focus is developing first-in-class innovative medical solutions for pregnant mothers and babies before and after birth.

**Center for Translational Imaging**

The Center for Translational Imaging (CTI) comprises teams of engineers, physicians, graduate students and clinical fellows to bring new imaging technologies into clinical use. Teams are focused on developing solutions for major unmet needs in clinical medicine. The technologies developed can be generated from many disciplines: the physics of image acquisition, imaging hardware, novel clinical protocols, signal processing and image analysis. The broad experience and expertise of the teams encourage rapid prototyping and feedback between disciplines and immediate application to clinical problems.

The ultimate goal of the Center is to rapidly put in place new methods of diagnosis and image-guided therapy to reduce suffering. Success is measured by more precise application of therapy and better patient outcomes.

**Retinal Engineering Center**

The mission of the Retinal Engineering Center (REC) is to combine the wealth of Engineering and Medical expertise and resources in the San Diego area to develop a retinal implant capable of restoring vision to patients suffering any of several retinal diseases. With around 1 million people possessing severe vision loss in America alone, and another 1.5 million having some degree of loss, the need for such a device is paramount. This is especially true given the growing elderly population, which is particularly prone to the most common form of retinal disease: age-related macular degeneration. The elderly are not the only people at risk, though. Improved retinal prostheses will also benefit those suffering the second most common retinal disease: retinitis pigmentosa. This disease affects all age groups, notably children possessing a genetic predisposition.

**Vaccine Engineering Center**

The vision of the Vaccine Engineering Center (VEC) is to meet the need of using engineering approaches to discover novel antigens, epitopes, and adjuvants that can stimulate and manipulate the immune system, as well as their targeted delivery, for the prevention and treatment of important diseases such as cancer and infectious diseases. Vaccination is the single most successful and cost-effective intervention in medical history. However, many of the vaccines that we know and use were discovered more than 50 years ago. About 2 years ago, cancer vaccination moved from a theoretical concept to an actually working intervention. This became possible by manipulating the co-inhibitory receptors PD1 and CTLA4 with antibodies and recombinant fusion proteins.

**Von Liebig Entrepreneurism Center**

The Center’s mission is to inspire entrepreneurism and catalyze commercialization of UCSD inventions through grants, education and business mentoring.

**Whitaker Center for Biomedical Engineering**

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The Whitaker Center for Biomedical Engineering (WCBE) was established to foster and enhance interactions between IEM, the UCSD Bioengineering Department, and Industry. WCBE's guiding principle is enriching the education and training of students for greater success in their future careers.

Bioengineering Institute of California

The University of California’s Bioengineering Institute of California (BIC) consists of ten campuses. All ten have Bioengineering programs, with eight of them having Departments of Bioengineering. Collectively there are about 340 faculty, over 750 graduate students, and nearly 2,500 undergraduate students. The three National Laboratories (Lawrence Berkeley, Lawrence Livermore, and Los Alamos) are also partners of BIC.

Mission Statement:  BIC facilitates cross-fertilization in research and training among campuses in the interdisciplinary field of bioengineering. Our mission is to synergize the strengths and expertise on different campuses, and foster the cooperation among them to create a coherent and cohesive network of shared information, resources, dissemination and public engagement.

Additional Information can be viewed on their website at: https://iem.ucsd.edu/

Qualcomm Institute

At UCSD, we have developed a highly successful branch of one of the California Institutes for Science and Innovation, the Qualcomm Institute (QI), which houses more than 600 researchers from 26 different academic units on the entire UCSD campus. Over its 15 years, the QI serves as an intellectual catalyst for the entire community which has resulted in new ways to teach students and faculty to collaborate in an effective manner. Also, importantly, QI has bridged the academic world with the private sector. Of the six floors of the Qualcomm Institute, one entire floor has been devoted to the Qualcomm Institute Innovation Space, a location in which small start-up companies can apply for entry for periods of 1-3 years to further the incubation of their ideas with close collaboration of UCSD faculty. The idea here is to jump-start the technologies that these companies produce that are scalable in the marketplace and make an impact overall. The SPH will embrace the QI style and Design Lab systems perspective in engaging the private sector and teaching to address public health problems.

Additional Information can be viewed on their website at: http://qi.ucsd.edu/

Women, Gender, and Health

Women’s Health Center of Excellence

More than 50 faculty, postdocs and graduate students from multiple disciplines including pediatrics, basic science, behavioral science and health behavior change, psychiatry, reproductive medicine, nephrology, geriatrics, epidemiology, complementary and integrative medicine, preventive medicine and others participate in Center activities.

The mission of the Center is to produce evidence to improve population health and healthcare for women of all ages and to partner with clinicians, scientists and educators across the UC campus, as well as women and their advocates throughout San Diego and in the wider world, and to ensure that this evidence is disseminated and translated for the betterment of women’s health. To accomplish this mission, the WHCOE focuses on initiatives to:

- Stimulate and foster large collaborative research projects devoted to various aspects of women's health across the lifespan.
Develop resources to support the career development of students, postdoctoral fellows and junior faculty who are the next generation of women’s health researchers.

Enhance the curriculum of the UCSD medical school and Joint Doctoral Program in Public Health by teaching courses with state-of-the-art women’s health content, and ensure that content related to women’s health and gender differences is infused throughout the curriculum of the medical school and JDP program wherever appropriate.

Provide mentored, collaborative research experiences in women's health to students and junior faculty at all levels, including physicians in the division of Family Medicine.

Disseminate scientific evidence to clinicians, the community at large, and policy makers to improve women's health care, for both prevention practices and treatment.

Establish and maintain a strong relationship between our new Center, the UCSD clinical community, and women and their advocates in San Diego and the wider world to facilitate an ongoing, multidirectional exchange of evidence, best practices, challenges and ideas.

**Center for Better Beginnings**

The Center for Better Beginnings at UCSD is a medical division of the Department of Pediatrics. We bring together multiple specialty programs that work together to promote maternal health and child development. Running throughout our work is the mission to advance the identification, prevention, and treatment of preventable birth defects. The Center for Better Beginnings focuses on four major areas of maternal and infant health: Clinical care of patients with birth defects and developmental disabilities, conducting research to better understand the causes, prevention and treatment of birth defects and developmental disabilities, teaching future generations of professionals in the fields of epidemiology, pediatrics, dysmorphology, genetics, pharmacology, and health behavior, and educating the public about prenatal exposures and exposures during breastfeeding and their impact on child development and health.

Additional Information can be viewed on their website at: [https://betterbeginnings.org/](https://betterbeginnings.org/)

**Larsson-Rosenquist Foundation: Mother-Milk-Infant Center of Research Excellence**

LRF MoMI CoRE is UCSD Health Sciences' most recent initiative to put human milk at the center of its health research and education efforts within the Department of Pediatrics. The mission of LRF MoMI CoRE is to unravel the complexity of human milk for optimal maternal and infant health by promoting excellence, synergy and innovation in research, clinical practice and education.

Four key values inform how LRF MoMI CoRE operates and shares its findings: Recognize and promote research excellence, recognize and promote synergy across disciplines (basic and clinical research, clinical practice, and education), promote innovation, discovery, and diversity of research topics, and recognize the power of disseminating accurate and simple messages. The center awards pilot funding (MoMI Seeds) to enable and jump-start innovative research ideas and provides fellowships (MoMI Fellows) to develop the next generation of leaders in human milk research.

Additional Information can be viewed on their website at: [https://healthsciences.ucsd.edu/research/coe/momicore/pages/default.aspx](https://healthsciences.ucsd.edu/research/coe/momicore/pages/default.aspx)

**Center on Gender Equity and Health**

The Center on Gender Equity and Health (GEH) was established by Drs. Anita Raj and Jay Silverman, in 2013 with support from the University of California at San Diego School of Medicine, and received
additional support from the University of California Office of the President. Its mission is to improve population health and development by elevating the status, opportunities and safety of women and girls, globally.

The Center takes a significant leadership role nationally, conducting innovative global public health research, providing medical and academic training for next generation scholars, and supporting development and evaluation of evidence-based policies and practices related to gender inequities, gender-based violence and health. GEH strives to bridge the gap between research and implementation, taking into account on-the-ground challenges and the lived experiences of women and girls worldwide. The Center is uniquely positioned to offer/contribute a gender emphasis to SPH scholars and trainees MPH course of study.

GEH provides training to undergraduate, graduate and medical students, and supports global public health professionals to conduct research that is informed by and highly relevant to the most pressing issues and debates facing policymakers. The Center has worked to engage post-doctoral fellows and faculty from across the UCSD campus, for the purposes of encouraging cross-disciplinary collaboration and the sharing of expertise. Currently, GEH-affiliated faculty include representation from the Division of Global Public Health, the Department of Reproductive Medicine, the Department of Economics, and the Division of Social Sciences. Our Center aims to foster the development of the next generation of researchers dedicated to improving gender equity and improving the health of women and girls around the world. Critical to this mission is not only recruiting and supporting the brightest young minds here to UCSD, but to establish scientific exchanges with academic institutions within the low and middle income nations with whom we work. To this end, GEH has already begun to initiate engaging international scholars, doctoral and postdoctoral trainees from in-country academic partner institutions to promote research expertise and capacity within affected countries.

In addition, GEH is staffed for program management and project analysis, the curation of social media presence and research dissemination. We have cultivated an extensive network of partners, including; The Bill and Melinda Gates Foundation, USAID, the David & Lucille Packard Foundation, the World Bank, UNICEF, Pathfinder International, the National Institutes of Health, the Pan American Health Organization (PAHO) and the Ministries of Health of the nations in which we work. Given the breadth of our network and staffing needs, our Center offers a unique opportunity for future public health students to gain exposure to, and experience in, not only academic research opportunities, but also the numerous and varied career pathways of public health.

Additional Information can be viewed on their website at: http://gph.ucsd.edu/cgeh/Pages/default.aspx

Other Health Sciences Public Health Relevant Centers

Center for Research and Interventions in Tobacco Control

The mission of The Center for Research and Interventions in Tobacco Control (CRITC) is to create synergy among tobacco researchers at UCSD. It also emphasizes disseminating research results into practical interventions. UCSD has many strong tobacco control researchers with wide-ranging research interests from the study of the etiology of tobacco use and the neurobiology of nicotine dependence to behavioral interventions and policy analysis. The Center aims to provide a forum to stimulate discussion of new ideas and to encourage collaboration among center members. Members of the Center include epidemiologists, psychologists, physicians, economists and mathematicians from multiple departments of UCSD, as well as collaborators from San Diego State University and Cal State San Marcos.
The Center has been true to its mission to both conduct research and influence the implementation of practical interventions. In addition to high profile randomized control trials (RCTs) testing intervention effects and analyses of population trends in tobacco use, Center members have also worked tirelessly to address disparities associated with tobacco use. This includes work with the American Indian population, which has a higher smoking prevalence than any other ethnic group; work with the homeless population that has high rates of mental illness and substance use as well as high smoking prevalence; and work with recent immigrant populations, who are limited in English language and cultural proficiency.

A significant part of the work on disparities is to increase access to evidence-based smoking cessation treatment by segments of the population that are traditionally underserved. A number of studies by CRITC members have shown that, with proper promotion, the use of quitline counseling by African American smokers can equal and even surpass that of White smokers. Similarly, recent Asian immigrants, who have been considered the least likely group to use evidence-based treatment, can be motivated to use quitline counseling when appropriate promotional messages are crafted to match with their cultural expectations.

The U.S. Centers for Disease Control and Prevention has established a national Asian Smokers’ Quitline (ASQ), to be housed in the UCSD Cancer Center, led by investigators of CRITC. ASQ is also a founding member of Asia-Pacific Quitline Network, making its work known in the Asia Pacific Rim and setting up collaborative projects that focus on dissemination and implementation research with institutions in member countries.

Another major achievement is the establishment of a smoking cessation network called UC-Quits. The project utilized CRITC bioinformatics expertise and the initial work of the California Smokers’ Helpline, based at UCSD, to help set up the connection between five UC medical centers and the Helpline’s cessation service. A smoking cessation module was programmed and implemented in the EMR (electronic medical record) system so that checking smoking status is embedded as part of the routine medical service. Once the tobacco use status is identified, the information is directly transmitted to Helpline via the EMR. Helpline counselors then take the initiative to contact the smokers, instead of waiting for them to call the Helpline. This proactive approach has significantly changed the dynamics of service delivery and is currently being tested for its effectiveness and potential for dissemination.

Center for Cardiovascular Epidemiology and Prevention

The Center of Excellence in Cardiovascular Disease Epidemiology and Prevention gathers leading experts from various disciplines with a mission of being a leading authority on the prevention of cardiovascular diseases in the United States and globally by 1) conducting innovative and applicable research across a range of disciplines and approaches and 2) providing in-depth and contemporary training on theoretical and applied epidemiologic principles for investigators at all stages of training/experience. The objectives and goals of the CVD Epi Center are to:

- Conduct prevention research focused on CVD.
- Provide pre-doctoral and post-doctoral training programs aimed at teaching an integrative approach using epidemiologic principle.
- Afford the opportunity for advancement of trainees.
- Offer educational opportunities for those interested in CVD prevention.

A T32 Training Grant is associated with the CVD COE with 3 post-doctoral positions and 2 pre-doctoral positions.
Center for Research and Training in Integrative Health

The Center of Excellence in Research and Training in Integrative Health (CERTIH) was launched in May 2015 to bring together approximately two dozen UCSD faculty doing research in integrative health as partners with clinicians offering services through the clinical Center for Integrative Medicine (CIM) launched at UCSD in 2011. IH researchers have focused primarily on pain, heart failure, hypertension and PTSD in clinical populations.

What is now called Integrative Health (IH) or Integrative Medicine (IM), and what was formerly called Complementary and Alternative Medicine (CAM), refers to evidence-based complementary therapies such as acupuncture and massage being offered in conjunction with allopathic medicine. The National Center for Complementary and Integrative Health at the National Institutes of Health (NIH) defines integrative health as “combining mainstream medical therapies with complementary health approaches and products that are not presently considered to be part of conventional medicine, but for which there is some high-quality scientific evidence of safety and effectiveness”. Compared to traditional allopathic medicine, IH can be considered a more healing-oriented medicine, emphasizing the innate healing potential of every individual in the context of a therapeutic relationship with the healthcare provider. The aims of the Center of Excellence (CoE) are ambitious:

1. Serve as the hub for IH research excellence and collaboration within UCSD and across the greater San Diego region
2. Advance research excellence in IH to transform how medicine is practiced
3. Support education and mentorship in IH research for students as well as health professionals
4. Help to guide the creation of new models of clinical care, combining the best of traditional medicine and established healing practices

Integrated within the CoE is the UCSD Integrative Health and Mind-Body Biomarker Laboratory (IH-MMB), which provides biomarker assay consultation, assay performance, and data processing and interpretation services to academic and industry investigators to facilitate biomarker investigations for research in IH, behavioral medicine, and brain-body connections, as well as more traditional biomedical research. Collaborative efforts to foster biomedical and clinical research is the core mission of this laboratory. The lab is currently actively collaborating on several integrative, mind-body research projects, including in heart failure, myocardial infarction, hypertension, cancer, and pain patients, and examining effects of meditation, Tai Chi, acupuncture, guided imagery, journaling, and Ayurveda. It is the vision of the CoE to develop additional laboratory support in the areas of fMRI, microbiome, electrophysiology, and epigenetics in collaboration with research committee members that have expertise in these areas.

Additional Information can be viewed on their website at: https://healthsciences.ucsd.edu/som/fmph/research/centers/integrativehealth/Pages/default.aspx

Center for Health Behavior and Equity

The purpose of this Center is to build and advance the science of health behavior change and to contribute to eliminating health disparities among underserved populations. We are also particularly interested in supporting the career development of diverse students, post docs and faculty. Membership includes faculty from the Departments of Family Medicine and Public Health, Medicine, and Pediatrics. Research populations have spanned East African, Latino, homeless, refugees and veterans with addiction issues, and topics range across chronic disease screening and prevention to exercise, community-based cancer genetics and mental health.
The Center for Health Equity and Promotion is focused particularly on fostering collaborations across disciplines, and partnership with the communities with whom we are engaged in research. Collaboration with local communities has required substantial investment in developing and refining partnerships between researchers and the greater San Diego community in order to develop a shared understanding of a community’s identity and sensitivities in order that research successfully engage community partners; consistent outreach and engagement are thus an essential and ongoing part of our work.

By way of example of the important work of community engagement that must be accomplished in a culturally sensitive and effective research study, the “Hawaash Study” is a partnership with our faculty initiated by members of the San Diego East African community. The aim of the study is to better understand dietary practices, nutrition transitions, and culturally competent research approaches and topics for this community. Leaders from the community have also composed a companion Perspectives Piece that details their experience with the project and their needs in a research partnership. This community led work will accompany the manuscript for peer-review. In an effort to train the next generation of investigators who aim to eliminate health disparities among underserved populations, we have also offered opportunities for postdoctoral fellows and junior faculty to discuss their research as it progresses. Mentoring is provided in the development of grant and career development award proposals.

Additional Information can be viewed on their website at: https://ucsdcommunityhealth.org/

UC San Diego Institute for Public Health

The broad network encompassed by the UCSD Institute for Public Health (IPH) reflects the exceptional intersection of public health with other campus departments. The IPH was established in late 2014 by the Associate Dean for Public Health in Health Sciences to bring together UCSD students and faculty interested in public health, and to improve the health and wellbeing of populations locally, nationally, and globally. IPH engages in four primary activities: the annual Public Health Research Day event, ongoing Interest Group activities, annual Pilot Grant Awards, and the cross-sectoral Public Health Seminar/Events Series. The Institute has been met with enthusiasm and participation from every corner of campus. With involvement from over 40 departments across UCSD, the Institute also serves as a hub for interdisciplinary research collaborations and links public health educational activities and programs across the campus. The IPH is student centered, research focused, and community engaged. It brings together students and faculty at UCSD interested in public health to improve the health and wellbeing of populations locally, nationally, and globally. The enthusiastic reception from faculty and staff across campus, in combination with our particularly close collaborations discussed above with SIO and the Jacobs School of Engineering, speak to the tremendous cross-disciplinary reach and close campus connections of our public health activities.

Additional Information can be viewed on their website at: http://publichealth.ucsd.edu/
### APPENDIX F: ENDOWMENT INITIATIVES

**UCSD School of Public Health Wertheim Endowment Initiatives**  
Based on $25M initial gift only

#### Education Programs and Community Engagement

<table>
<thead>
<tr>
<th>Activity</th>
<th>Annual Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Scholarships &amp; Fellowships</td>
<td>$400,000</td>
</tr>
<tr>
<td>Student and Faculty Active Research and Collaboration</td>
<td>$80,000</td>
</tr>
<tr>
<td>Education Programs MSO staff position</td>
<td>$30,000</td>
</tr>
<tr>
<td>Outreach, PR, Web, Social Media, Marketing staff position</td>
<td>$30,000</td>
</tr>
<tr>
<td>Public Oriented Lectures</td>
<td>$15,000</td>
</tr>
</tbody>
</table>

#### Faculty Development

<table>
<thead>
<tr>
<th>Activity</th>
<th>Annual Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Conference</td>
<td>$40,000</td>
</tr>
<tr>
<td>Faculty Training and Development</td>
<td>$30,000</td>
</tr>
<tr>
<td>Research Lecture Series</td>
<td>$25,000</td>
</tr>
</tbody>
</table>

#### Research and Faculty Growth

<table>
<thead>
<tr>
<th>Activity</th>
<th>Annual Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Pilot Grant Programs *</td>
<td>$200,000</td>
</tr>
<tr>
<td>Faculty Research Growth: Recruitment &amp; Startup Funding</td>
<td>$150,000</td>
</tr>
</tbody>
</table>

#### Total Annual Investment

$1,000,000

Estimated distributions of annual $1M endowment payout.
* Research pilot grants will seed subsequent proposals for substantial extramural funding to the School, including IDC return to the SPH operating budget.
APPENDIX G: INDIRECT COST RECOVERY MOU FOR SPLIT/JOINT APPOINTMENTS (SAMPLE)

The purpose of this memo is to define the Indirect Cost Recovery (ICR) sharing policy for ICR related to PIs with joint appointments between academic Vice Chancellor areas: Academic Affairs, Health Sciences and Marine Sciences. This agreement defines the general methodology for the distribution of ICR between Vice Chancellor areas.

BACKGROUND

Currently, under the UCSD campus' Indirect Cost Recovery Revenue Sharing Model, the three academic areas, receive 50% of indirect cost recovery generated with annual increments or decrements based on 50% share relative to the 2011/12 base. This distribution allocates all the VC share of ICR to the VC whose unit administers the award. The agreement is a method to recognize that the investment in the appointment (FTE, start-up and renovation) as well as the providing of space should be accounted for.

DISTRIBUTION METHODOLOGY FOR INDIRECT COST RECOVERY BETWEEN VCs

The following principles will guide the distribution methodology:

The department (and thus, VC area) that submits the grant will, by default, receive the credit and the related ICR via the campus ICR model.

The VC area receiving credit will be responsible for the annual calculation of the share of the ICR related to the grants with jointly appointed PIs, and provide annual accounting to the joint VC area.

The share of the ICR related to the grants will be distributed as follows:

- 1/3 based on the proportion of assigned space
- 1/3 based the unit providing the research administration support
- 1/3 based the proportion of resources provided for the appointment. Such resources would include the value of the base FTE, startup support and renovation costs

Department shall reference this agreement and any future modification in faculty joint appointment MOUs as the governing agreement for distribution of ICR.

If the unit providing space charges rent to the occupying PI, then the split of the IDCR should be based equally on pre-dominant administration and startup support.

If PIs are submitting grants through both VC areas, both VC areas are responsible for the annual calculations for their respective areas, with distributions to follow independently. Negotiation for simplification of transactions are between the VC areas.

Calculations of share of ICR must be completed annually. Transactions for distribution of ICR must be executed annually 30 days after the Campus Budget Office distributes final.
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APPENDIX H: LETTERS OF SUPPORT

5 October 5, 2017

David A. Brenner, MD
Vice Chancellor for Health Sciences
Dean, School of Medicine
UC San Diego Health
9500 Gilman Drive
MC 0602 La Jolla, CA 92093-0602

Dear Dr. Brenner,

It is with great enthusiasm that I provide my full support for the creation of a School of Public Health (SPH) at the University of California, San Diego. I am an alumnus of UCSD, having completed my MD degree in 1989, and was honored as an Outstanding Alumnus of the University this past year. I have held faculty positions at the University of Washington, Johns Hopkins University and Stanford University, and have directed Family Health and catalyzed the creation of gender equality programs at the Bill and Melinda Gates Foundation. My career has been devoted to teaching and conducting research in women’s and children’s health in low and middle-income countries globally.

As the UCSD community contemplates the creation and positioning of its SPH, it is important to consider the context in which this School will be born. Academic global health is in a period of transition away from a traditional structure of “vertical” disciplines housed within a school of public health that is relatively insular from the rest of the university. In recent years, with dynamic demographic and epidemiologic transitions playing out in countries throughout the world, the new challenges and conditions that are the focus of global health and development professionals today have increasingly become inter-dependent with the concerns of schools of medicine, engineering, earth and environmental sciences, education, social sciences, public policy and business.

In order to advance the health and development of the world’s populations in the 21st century, new models of transdisciplinary science and integrated programs of education are required. Today’s students are eager for—moreover, they demand—opportunities for cross-disciplinary learning that will equip them to tackle today’s most pressing global challenges. New technological and scientific discoveries require new leadership to create ecosystems that reward transdisciplinary research and embrace the risks that are inherent to innovation. New public-private partnerships and new business models are needed to enable sustained impacts on health and development. Modern medicine and public health must shift from reactive, curative medicine to precision healthcare that optimizes resilience, population health and the performance of health systems, and enables all people to achieve their full human potential.

UCSD is just the place to spawn this modern revolution in public health. UCSD has the lack of tradition, the creative energy, the enterprising nature and partnerships, and the foundation of expertise in wide-ranging disciplines that equip it to seize the opportunity to create a world-leading hub of knowledge.

Division of Neonatal and Developmental Medicine
1265 Welch Road X135• Palo Alto, California 94305-1510
generation and innovation in public health. With Mexico and military populations in UCSD's backyard, the SPH will have unique opportunities to understand and address issues of migration, refugee health and healthcare in situations of conflict. Similarly, through joining hands with the Scripps Institute of Oceanography, the SPH will also be positioned as a world leader in addressing climate change and health. The creation of a SPH at UCSD would be a major advance for UCSD students, faculty, staff, alumni, and the San Diego philanthropic and private sectors communities. The entire global health enterprise needs the leadership, inspiration and innovation that UCSD can bring to public health.

I embrace the principles, concepts and rationale put forward for the creation of a SPH at UCSD, and give my most enthusiastic endorsement to this idea. Please let me know how I can help promote and contribute to the creation of this exciting and transformative venture.

Sincerely yours,

[Signature]

Gary L. Darmstadt, MD, MS
Associate Dean for Maternal and Child Health
Professor, Department of Pediatrics
Co-Director, Global Pediatric Research
Faculty Fellow, Center for Innovation in Global Health
Senior Fellow, Freeman Spogli Institute for International Studies
Faculty Scholar, Clayman Institute for Gender Research
Faculty Affiliate, Stanford Center on Global Poverty and Development
Member, Center for Population Health Sciences
Member, Stanford Medicine Teaching and Mentoring Academy
October 4, 2017

Dr. David Brenner
UC San Diego Health
Office of the Vice Chancellor for Health Sciences and Dean, School of Medicine
9500 Gilman Drive
MC 0602
La Jolla, CA 92093-0602

Dear David,

Thank you for the invitation to contribute to the discussion of the University of California at San Diego creating a new school of public health.

This sounds like an exciting vision and I congratulate you on this initiative. Critical to the success of such an endeavor is to seek the accreditation of the School of Public Health and membership in the Association of Schools and Programs in Public Health (ASPPH). I wish you the best in this process.

Sincerely Yours,

Linda P. Fried

Linda P. Fried, MD, MPH
Dean and Dean, School of Public Health
Senior Vice President, Columbia University Medical Center
Professor of Epidemiology and Medicine
lpfried@columbia.edu
September 27, 2017

David A. Brenner, MD
Vice Chancellor for Health Sciences and Dean, School of Medicine
UC San Diego Health
Office of the Vice Chancellor for Health Sciences and Dean, School of Medicine
9500 Gilman Drive
La Jolla, CA 92093-0602

Dear Dr. Brenner,

On behalf of the Center for Public Health Practice, within the University of Pittsburgh Graduate School of Public Health, we are delighted to offer support for the proposal to establish a School of Public Health (SPH) at UC San Diego (UCSD).

The SPH will build on UCSD’s strong foundation of existing, traditional public health degree programs by adding novel programs that address evolving public health science and workforce needs. Situating the SPH within Health Sciences will foster a broader perspective on health, aligning with health system transformation toward population health and community-based care, with a prevention focus. Engaging UCSD Health, VA/DOD health systems, and related Health Sciences programs will support interdisciplinary training and mentorship, and the SPH’s proximity to the main UCSD campus will support interdisciplinary training with non-traditional yet public health-impacting disciplines.

Other unique UC San Diego opportunities include its shared border with Mexico: the cross-border region offers insights into cultural, religious, economic and other social impacts on health behaviors, as well as diverse educational, research and service opportunities. Strong local partnerships with the VA and DOD provide opportunities for collaboration on education and research related to military populations, such as trauma, suicide, and substance use disorders, as well as military engagement related to the impacts of climate change and disasters. Also, San Diego is one of the leading high-tech hubs in the U.S. with established strengths in wireless health and information technology, biotechnology, and life sciences.

Given this context, UCSD has the opportunity to create a school that integrates excellence in traditional areas of public health with emerging paradigms for solving public health challenges in Southern California and beyond, by expanding the cadre of professionals equipped to meet this need through rigorous, highly interdisciplinary training. We are pleased to offer our support. If you have additional questions, please contact me at wendy.braund@pitt.edu or 412-383-2400.

Sincerely,

Wendy E. Braund, MD, MPH, MSED, FACPM
Director, Center for Public Health Practice
Associate Dean for Public Health Practice
Professor, Health Policy and Management
September 22, 2017

David A. Brenner, MD
Vice Chancellor for Health Sciences
Dean, School of Medicine
UC San Diego
1318 Biomedical Sciences Building
9500 Gilman Drive
La Jolla, CA 92037-0602

Dear Dr. Brenner:

I am delighted to offer my support for UC San Diego’s proposal to establish a School of Public Health. As Dean of the Rollins School of Public Health and former Assistant Surgeon General at the Centers for Disease Control and Prevention, I am acutely aware of the significant public health challenges facing communities around the world.

There is a critical need for highly trained professionals who can thrive working in cross-disciplinary teams to solve these complex problems. I am confident that UC San Diego’s proposal, which integrates traditional public health expertise with fields such as engineering, medicine, and oceanographic studies, will foster a dynamic learning environment that will improve well-being both locally and abroad. The importance of training this new generation of researchers and practitioners cannot be understated as we address longstanding health threats from diseases such as HIV/AIDS, Hepatitis A, and Ebola, as well as the rise of antimicrobial resistance, food scarcity, violence, and environmental pollutants.

I also recognize from our correspondence your strong aspiration to seek accreditation for your MPH program and School through the Council on Education for Public Health (CEPH) and to seek membership in the Association of Schools and Programs of Public Health (ASPPH). Such aspirations are crucial to assure the success of your School. The future for this effort seems very bright.

I strongly believe the UC San Diego School of Public Health will serve as a catalyst and partner with existing and successful public health schools such as ours, and I look forward to seeing the positive impact its educators, researchers, and graduates will have in San Diego and around the globe.

Sincerely,

James W. Curran, MD, MPH
James W. Curran Dean of Public Health
Professor of Epidemiology
Co-Director, Emory Center for AIDS Research

Emory University
1578 Clifton Road NE
Atlanta, Georgia 30322

Tel 404.712.8720
Fax 404.712.4879
jcurran@emory.edu
www.sph.emory.edu

The Robert W. Woodruff Health Sciences Center
EEO/AA/Disability/Veteran Employer
October 2, 2017

David A. Brenner, MD
Vice Chancellor for Health Sciences and Dean of Medicine
UD San Diego Health
9500 Gilman Drive, MC0602
La Jolla, CA 92093-0602

Dear Dr. Brenner:

I write in support of your proposal to establish a School of Public Health at UC San Diego. Already you have an excellent public health program, forming a sturdy foundation from which to build a School. Moreover, your partnerships across the outstanding research campus at UCSD as well as within and around the San Diego community comprise a remarkable basis for training, collaboration and research to address some of the most important public health problems of the day. I have carefully read the draft executive summary of your proposal. The assessment of need and the opportunities for meaningful employment that await our graduates are stated realistically. The resources that are available reasonably match what will be needed to launch a successful school of public health. The potential benefits to the UCSD campus, and system-wide, are also stated realistically.

I would expect a School of Public Health at the UCSD to strongly complement and round out the public health training and research across the entire UC system. While the population of California has grown and public health issues become ever more complex, the state has not experienced any where close to the commensurate growth in capacity for training and research in public health within California. The region around San Diego and the California-Mexico border is an important laboratory for understanding health issues with global dimensions, such as, outbreaks of emerging infectious diseases like Zika virus, rising rates of antimicrobial resistance globally, and global environmental issues like contaminated drinking water, air pollution and climate change. The unique academic resources and outstanding researchers on the UCSD campus provide a unique opportunity for broad interdisciplinary collaboration to address complex public health issues. This seems to be the right idea, at the right time, in the right place.

In closing, this is a very exciting undertaking, and I support it whole-heartedly.

Very truly yours,

[Signature]

Lynn R. Goldman, MD, MS, MPH
Michael and Lori Milken Dean of Public Health
April 17, 2018

Drs. David Brenner and Douglas Ziedonis
School of Medicine
University of California, San Diego
500 Gilman Drive #0692
CA La Jolla 92093

Dear Drs. Brenner and Ziedonis,

I’m writing this letter to support your proposal to develop a new School of Public Health at UC San Diego. As you know, San Diego State University and UC San Diego have had long standing collaborations and partnerships. We see that the proposed School of Public Health would be complementary and synergistic with the SDSU Graduate School of Public Health. We will continue our excellent collaborations, such as the Joint Doctoral Programs in Public Health.

Your strengths at UCSD in Health Sciences including UCSD Departments of Psychiatry, Medicine, Family Medicine, and Public Health add to the richness of the collaborative opportunities between our two schools. Similarly, we believe that the breadth of academic pursuits across the UCSD campus and affiliates, as outlined in your proposal to include Scripps Institution of Oceanography, Jacob School of Engineering, and the Rady School of Management, will also add to our ability to understand rapidly evolving areas of climate change or data science and their impacts on public health.

As you know our Graduate School of Public Health also has many strengths, which include community engagement, community-based participatory research, health disparities research, racial and sexual minority health and health equity in public health, environmental health assessment, and surveillance.

While I believe that the SDSU’s Graduate school of Public Health and the UC San Diego proposed school of public health can coexist in San Diego, given separation of missions and focus areas, continued open communication channels will be needed to ensure that training programs remain complementary rather than competitive.

Good luck in your process and we look forward to our ongoing collaborations.

Best wishes

[Signature]

Stephen Welter
Vice President for Research
Dean of Graduate Affairs

San Diego State University
RE: School of Public Health

As Division Chief of the Infectious Diseases and Global Public Health in the Department of Medicine in the UCSD School of Medicine, I write this strong letter of support for the new UCSD School of Public Health. The ID+GPH division is comprised of 79 faculty, and 30+ are directly involved in public health practice, research and/or education. The division has the largest research portfolio within the Department of Medicine with $33 million in annual independent research funding. A large portion of this research is directed in tackling some of the biggest public health issues of our time. In that context, the faculty in the ID+GPH Division are enthusiastic about the development and launch of the new UCSD School of Public Health. Across the board, junior and senior faculty express strong interest in joint the SPH as a primary appointment based on new teaching and research opportunities. In particular, Division faculty are excited about the idea of building a critical mass of public health expertise and infrastructure at UCSD centralized in a SPH with sufficient resources to spur innovation. It is envisioned that 10-15 faculty will move their primary appointment to the new SPH, while another 10-15 faculty will seek joint appointments. Such joint appointments will be useful to expand teaching opportunities and research collaborations. Overall, the members of the ID+GPH Division remain enthusiastic and engaged for a successful UCSD SPH.

Sincerely,

Davey Smith, M.D.
Professor and Head
Division of Infectious Diseases & Global Public Health
Department of Medicine
March 29, 2017

David Brenner, MD  
Vice Chancellor for Health Sciences  
Dean, School of Medicine  
University of California, San Diego  
9500 Gilman Drive MC 0602  
La Jolla, CA 92093-0602

Dear Dr. Brenner:

As Dean of the Skaggs School of Pharmacy and Pharmaceutical Sciences (SSPPS) and Associate Vice Chancellor or Health Sciences, it is my pleasure to support the establishment of a School of Public Health (SPH) at UC San Diego.

In light of current public health issues such as emerging infections in San Diego County, and the documented need for new public health professionals, the time is now to establish a School of Public Health at UC San Diego. The SPH can build upon an already strong foundation of existing public health degree programs at UC San Diego and an existing spirit of interdisciplinary health science training. In this latter regard, I foresee an important interface between trainees in the School of Public Health and students in our School of Pharmacy working on both PharmD and PhD degrees. I have had personal experience mentoring MPH-PhD students from UC Berkeley and recognize the importance and timeliness of interdisciplinary education.

There are many opportunities for collaborative educational and research programs between the School of Public Health and SSPPS. There is a logical interface for education in both pharmacy and public health in areas such as pharmacoconomics, pharmacoepidemiology, and pharmacogenomics. Furthermore, in this era of globalization, the public health workforce needs to be trained to address emerging health threats and understand the challenges of prevention, diagnosis, and treatment of diseases worldwide. SSPPS has established an interdisciplinary team focused on global infections including faculty from the Scripps institution of Oceanography, the School of Medicine, and Bioengineering. I will also help faculty in the School of Public Health interface with private industry in San Diego County. In this regard, we already have collaborations with Janssen, Merck, and Pfizer. We
provide laboratory incubator space for new biotech companies, and are partnering with Selva Pharmaceuticals to advance a new drug for Chagas Disease through FDA approval.

In summary, I applaud the effort to establish a SPH on our campus and look forward to supporting this effort; and I am well aware of the mutual benefit a SPH will have for students in the Skaggs School of Pharmacy and Pharmaceutical Sciences.

Sincerely yours,

[Signature]

James H. McKerrow, PhD, MD
Dean, Skaggs School of Pharmacy & Pharmaceutical Sciences
Associate Vice Chancellor for Health Sciences
October 17, 2018

DR. DOUGLAS ZIEDONIS
ASSOCIATE VICE CHANCELLOR FOR HEALTH SCIENCES

SUBJECT: School of Public Health Letter of Support

On behalf of Scripps Institution of Oceanography (SIO), we are writing to express our enthusiastic support for a School of Public Health (SPH) at the University of California, San Diego (UCSD). SIO leads UCSD’s programs in environmental and earth sciences, and we look forward to collaborating with the SPH to make important contributions to the study and mitigation of public health effects of climate change and other environmental hazards.

Scripps is a unique resource within the UC System. We are one of the world’s oldest, largest, and most important centers for ocean and earth science research, graduate training, and public service. In its most recent survey of graduate schools, the National Research Council ranked Scripps the number one oceanographic program in faculty quality, distinction, and scholarly publications. Scripps’s preeminence in many scientific fields reflects its continuing commitment to excellence in research, modern facilities, distinguished faculty, and outstanding students . . . and the vision continues to grow.

Scripps Oceanography spans the realms of sea, air, land, and life in efforts to determine how Earth systems work and interact. Among the hundreds of research programs underway at Scripps, many are multidisciplinary, linking discoveries in one subject to advances in other studies. This approach to basic science is now being applied to how the physical environment affects life systems and to aspects of global change, ocean pollution, and marine resources. In collaboration with SPH, we are poised to make important contributions to the study and mitigation of the potential health consequences of climate change.

Scripps has already emerged as a leader in climate change research, and has established several interdisciplinary centers that would be excellent candidates for working with SPH. The Center for Climate Change Impacts and Adaptation (CCCA), the Center for Oceans & Human Health (COHH) and the Center for Western Weather and Water Extremes (CW3E) would all be good partners to investigate the emerging threat of climate change and its associated effects.

Given the importance of climate change and public health, and the unique resources that SIO provides, we have already embarked on the type of collaborations that we envision with the SPH. Faculty in Health Sciences and SIO are investigating and analyzing climate data to see how our environment impacts food production, air quality, and water availability. Current projects
investigate human adaption to urban growth, climate variability, and small-scale extremes (e.g., heatwaves), particularly for vulnerable populations. For example, we have a collaborative project that looks at the impact of indoor cook stoves on the health of villagers in India by measuring health indices and particulate matter levels. This research will guide future development of cook stoves that produce lower pollutant levels.

These current studies provide a window through which to understand the large collaborative potential between public health at UC San Diego and the unique resource of SIO, as well as the potential public health benefits to the region, nation, and world. Because SIO has no equivalent at other UC campuses, the potential for groundbreaking work at the nexus of climate change and public health is unique to UC San Diego within the University of California system. We look forward to building on these first initiatives in developing world-class programs and curricula.

In addition, two new faculty that were recently jointly appointed by Health Sciences and SIO provide an example of the rich potential for collaborative work. One such faculty member worked with various types of modeled and observed climate, weather, and human data, to examine the interactions of exposures in vulnerable urban subpopulations, such as children, and the spatial mismatch that exists between scales. That individual also worked with Bioengineering faculty on a project to measure vital signs among school children on playgrounds during heat waves. This tripartite collaboration across Public Health, SIO and Bioengineering is an exciting indicator of the great potential in this new area of team science. Another faculty member occupies a unique niche combining expertise in epidemiology study design and health risk assessment with climate and econometric models.

In addition to the research opportunities, we would welcome educational collaborations with SPH. SIO currently offers a number of undergraduate majors and graduate programs with relevance to public health that could be expanded as SPH comes to fruition. For example, the recently approved Masters of Public Health already engages students in an SIO class on Climate and Public Health as an elective. With a major interest in the impacts and adaptations needed to deal with climate change and changing oceans, SIO is keenly interested in expanding its portfolio of collaborative environmental science and human health programs, and we would appreciate the opportunity to have students working under joint supervision of health scientists and climatologists. We see a great deal of potential in interdisciplinary programs that we might collaborate on.

We look forward to engaging with SPH in activities to bring about advancements in science and technologies, and strongly support the establishment of this organization at UCSD.

Sincerely,

Margaret Leinen

Margaret Leinen

Cc: Guy Masters
Cathy Constable
November 15, 2017

TO: Pradeep Khosla, Chancellor
    Elizabeth Simmons, Executive Vice Chancellor, Academic Affairs
    David Brenner, Vice Chancellor, Health Sciences

FROM: Carol Padden, Dean, Division of Social Sciences
      Douglas Ziedonis, Associate Vice Chancellor, Health Sciences
      Thomas Csordas, Director, Global Health Program

RE: Proposal for a Master of Arts in Global Health in the Division of Social Sciences
    Proposal for a UC San Diego School of Public Health in Health Sciences

We are writing this memo to convey our support for two upcoming proposals: 1) for a Master of Arts in Global Health (MAGH) in the Division of Social Sciences and 2) for a UC San Diego School of Public Health (SPH) in Health Sciences. We believe that both the Master’s Program and School are each vital in UC San Diego’s educational and research missions in becoming world-class leaders in global and public health. We have been asked by the EVC and others to provide clarity on two questions: 1. What will be the administrative / programmatic relationship of the MAGH and the SPH? 2. How will the faculty in the MAGH and SPH work together in the future?

Regarding the first question, we have agreed that the MAGH remain in Social Sciences as proposed. If both the MAGH and SPH are approved, there may be future consideration for another arrangement; however, we have agreed that discussion should be delayed until a later date. One key issue that would be addressed is creating opportunities for students to take courses in both the MAGH and MPH programs (recognizing that the MPH has a two-year curriculum while the MAGH is a one-year program). The possibility of students taking electives across programs is well established, but less so across divisions and between self-supporting and state supported programs because of differences in financial structures. This could still be feasible with appropriate financial arrangements if courses are not over-enrolled and if the burden of prerequisites does not militate against reasonable time to degree. We will explore the possibility of cross enrollment in MAGH and MPH courses and of developing new, co-taught courses in the future if there is student demand, academic merit, and faculty interest in new collaborative teaching efforts.

Regarding the second question, we envision a great synergy between the two efforts. Some of our aspirational goals include expanding educational and research opportunities. In addition to shared courses, there are opportunities for educational collaborations such as interdisciplinary training, educational grants, and cross-divisional projects. We have already demonstrated some of this synergy in the co-sponsorship of invited speakers and student mentoring. There are also numerous opportunities to explore joint research collaboration, which would link faculty across divisions and schools, as well as more research-oriented entities like the Global Health Institute, Public Health Institute, and the Center for Global Mental Health.

Joint faculty hires are another avenue of possible synergy, as well as exploring opportunities to work collaboratively with the UCSD Foundation and the Health Sciences and Social Sciences Advancement teams in philanthropy and other funding initiatives to support our missions.
November 15, 2017

Our respective leadership teams are structured in a manner that will allow us to rapidly identify and capitalize on new opportunities for collaboration. We have overlapping faculty who are engaged in current Health Sciences and Social Sciences activities and leadership roles in Global Health / Public Health. For example, Professor Steffanie Strathdee of the Department of Medicine is on both the SPH Executive Committee and the GHP Advisory Board, and Professor Thomas Coedas of the Department of Anthropology is the GHP Director and on the SPH Advisory Board. These and numerous other examples reflect our ongoing collaboration that will provide concrete opportunities for creating additional opportunities to synchronize activities and communication. This will help facilitate ongoing development of projects in the different mission areas as described above and below.

Background

The MAGH is soundly based in the social science understanding of the global burden of disease, particularly through the contribution of medical anthropology. There has been a long and active tradition of “medical social science” to which a number of our faculty in the Social Sciences contribute in partnership with colleagues across campus. The MAGH is built out of this tradition. We support moving forward with this graduate program not to create competition or overlap with the newly approved Master of Public Health (MPH), but to allow for the full development and flourishing of the social sciences approach to medicine, which includes examinations of cultural and social practices surrounding health and disease. The MAGH will be one of three degrees offered by the interdisciplinary Global Health Program in the Division of Social Sciences, adding to the existing Minor and BA in Global Health. All are administratively housed in the Department of Anthropology. As an interdisciplinary program its affiliated faculty and programmatic courses are drawn from Social Sciences, Arts and Humanities, Biological Sciences, the School of Management, and Health Sciences. Within Health Sciences, the primary collaborating departments for these degrees are Medicine, Psychiatry, and Family Medicine and Public Health. We anticipate these collaborative relationships to continue to develop over time.

If approved, the SPH will have some overarching and cross-campus responsibilities that will bring together Public Health and Global Health as a unified voice reflecting collaborations across the campus. There will be faculty who are primarily housed in the SPH and those based in other divisions at the University. The SPH aspires to be transformative, incorporating a wide and novel range of expertise across the campus, leveraging our many existing outstanding global- and public health-oriented faculty and programs, and capitalizing on our world-class strengths—and it will only be able to achieve this transformative role if it reaches well beyond its own faculty to effectively engage UCSD’s multidisciplinary communities in other Schools… Business concepts for sustaining public health initiatives, innovative technologies, and perspectives of environmental science, engineering, and social science (particularly economics, anthropology, political science, communication, psychology, and cognitive sciences) are critical components of our SPH. A School will provide a central point for fostering collaboration within our community and other outside partners. Situated within Health Sciences, the SPH would more directly bridge our clinical, biomedical, and engineering expertise with that of public health, supporting projects that address individual and population health problems at scale. Currently in Health Sciences we have the following existing public health and global health programs that we envision will become part of the SPH: Bachelor of Science in Public Health (BSPH) Program, Master of Public Health (MPH) Program, UCSD/SDSU Joint Doctoral Program (JDP) in Public Health, PhD Program in Biostatistics, Master of Advanced Studies in the Leadership of Healthcare Organizations (MAS/LHCO), a UCSD/SDSU Joint Doctoral Program (JDP) in Interdisciplinary Research on Substance Use (IRSU), and numerous global health educational programs through Health Sciences International. We also have proposed a Master of Science (MS) in Biostatistics Program.
November 15, 2017

After the SPH and MAGH are approved, there will likely be a need for a written MOU that will provide additional specificity beyond this initial document of intent. We anticipate that the SPH will be able to provide a supportive context for education and research — such as the Qualcomm Institute does for research — that creates a unique, non-traditional manner of engagement and creativity consistent with UCSD's values, history, and success. We look forward to engaging faculty, staff, and learners in the important areas of global and public health. Thank you for this opportunity to explain our planning efforts in these areas.

Carol Padden, Dean
Division of Social Sciences

Thomas Csordas, Director
Global Health Program

Douglas Ziedonis, Associate Vice Chancellor for
Health Sciences

cc: Kit Pogliano, Dean, Division of Graduate Studies
University of California San Diego
Att: Dr. Douglas Ziedonis, AVC Health Sciences
9500 Gilman Drive, MC 0602
La Jolla, CA 92093

Dear Dr. Ziedonis,

The Jacobs School of Engineering (JSOE) submits its most enthusiastic support for the creation of a School of Public Health at UC San Diego. In the following I will outline details of the JSOE’s rationale and support of such a School.

As the largest engineering school on the West Coast, JSOE is ranked 12th nationally, behind only UC Berkeley among UC campuses. Our Bioengineering is ranked 1st nationally by the National Research Council of the National Academies and first among UC campuses. Advances in communications technology, computer science and machine learning, nanotechnology, bioengineering, robotics, design, and human-computer interaction will support new methods for monitoring, understanding, and maintaining public health.

Current examples of collaboration medical sciences and engineering at UC San Diego include the Center for Wireless and Population Health Systems, which also leverages the analytical power of the San Diego Super Computer Center, and the innovative Institute for Engineering in Medicine which by design merges Engineering with UC San Diego Health Sciences efforts. These existing structures will be matched to the School of Public Health for detection, real time monitoring, and machine learning-based predictive algorithms for physical and mental health. The JSOE also hosts several Agile Research Centers such as the Center for Wearable Sensors and Center for Microbiome Innovation that are highly synergistic and are making active contributions to the interdisciplinary public health research environment at UC San Diego.

Indeed, a revolution in healthcare is underway shifting from “reactionary” care administered by highly trained caregivers in hospitals to continuous preventive care where the patient takes charge and care administered by everyone, anytime, and anywhere. The public has a major interest in this development. Engineering principles and design are and will be behind important novel and emerging health care programs such as the ability to provide TeleMental Health for psychiatric care of remote patient populations; a new technology for mental health detection; data driven informatics to target psychiatric care to the most needy; and usage of wearable devices and mobile technology for patient centered care.

A SPH at UC San Diego will be ideally positioned for national leadership in the development of technologies which support classic Public Health educational efforts, by partnering with the JSOE and particularly it’s Department of Bioengineering, the Qualcomm Institute, the new
Halicioglu Data Science Institute, the Design Lab, and the Engineering in Medicine. In Bioengineering and Nanoengineering an estimated 30% of the faculty and students are engaged in topics related to Public Health. Thus it is easy to envision how an SPH on our campus will be able to offer unique educational programs that merge engineering principles with public health.

Beyond research, educational collaborations with Public Health will involve faculty from the Bioengineering, Computer Science and Engineering, and Electrical and Computer Engineering Departments at JSOE. Nearly a third of faculty in the Department of Bioengineering are active in collaborative research efforts with Health Sciences faculty in public health through the JSOE Agile Center for Microbiome Innovation and Center for Wearable Sensors, and are members of the Institute for Engineering in Medicine. This provides a solid basis for the development of cross-listed courses that will fulfill requirements for both JSOE and SPH students.

We currently already offer eight courses at the core of the SPH curriculum including: Clinical Bioengineering (BENG 193), Algorithm Design and Analysis (CSE 202), Convex Optimization (ECE 273), and a highly popular Med-Into-Grad Initiative immersive clinical training program for PhD graduate students jointly with Biomedical Sciences. Faculty in Structural Engineering currently offer SE 265: Structural Health Monitoring, which is available to students throughout UCSD. A doctoral level course “Dissemination and Implementation Science in Health (FPM 291)” within the UCSD/SDSU JDP is an example of how to link engineering, medicine, and public health.

There is also the potential for JSOE and SPH could create a new joint Master's program in Global Health Technology and Practice. Additional options could include a new “Engineering MS in Public Health” taught by engineering faculty in conjunction with faculty in the SPH, a track in the MPH program focused on Technology in Public Health and a combined PhD / MPH in Bioengineering for students interested in issues of Public Health. We envision continued engineering efforts will be a strong component of the SPII over time.

Sincerely,

[Signature]

Albert P. Pisano, Dean
Irwin and Joan Jacobs School of Engineering
Walter J. Zable Professor of Engineering
Professor, Mechanical and Aero Engineering
Professor, Electrical and Computer Engineering
Member, National Academy of Engineering
October 15, 2018

David Brenner, MD
Vice Chancellor of Health Sciences
9500 Gilman Drive, MC 0602
La Jolla, CA 92093-0602

Dear Dr. Brenner,

As Chair of Pediatrics, I write this letter to strongly support the establishment of the School of Public Health (SPH), as part of the Health Sciences at UCSD. I believe such a School will be a great response to the fact that our world has become much smaller and what occurs anywhere in any continent will affect the USA as well as the whole globe, like so many previous diseases.

We have had previously many examples such as HIV/AIDS, SARS, Ebola and more recently the Zika virus crisis starting in Brazil and the amazing spread of the virus to various cities in the US affecting pregnancies and leading to microcephaly in infants, an incredible burden on society. I believe also that the establishment of such a School meshes very well with some of our strategic research plans in the Health Sciences, including the collaborative on antibiotic resistance and phage therapy.

The need for such SPH at UCSD should not be based only on infectious diseases and possible infectious catastrophes. Indeed, some of the major epidemics nowadays are not related to communicable diseases. Examples abound but two of them, obesity and the opioid crisis, will affect the globe unless effective measures are invented. Overweight and obesity in the San Diego area are reaching about 30-40% of children, threatening progress in human lifespan that we have made in the past 50 years. Opioid morbidity and mortality has reached a crisis of epidemic proportion. It is not surprising that there is so much interest in our Residents/Interns in public health. It is rare that we do not discuss such topics when we discuss future careers with so many of our trainees.

I would like also to place the SPH in context of UCSD. The strength of the University at large, especially in Engineering and in the Humanities, will give such a School an opportunity to leverage these strengths and excel. The health care arena is changing rapidly and taking advantage of newer technologies such as nanotechnology and wireless techniques and devices in collaboration with CalIT2 will be unique for SPH at UCSD when addressing challenges of population health.

In summary, the faculty of the Department of Pediatrics and myself support enthusiastically the establishment of such a School at UCSD. It is very timely and, when considered in the context of UCSD strengths in so many areas, SPH will succeed in no less a measure that the rest of the other Schools in this environment.

Sincerely,

Gabriel G. Haddad, M.D.

DEPARTMENT OF PEDIATRICS, 9500 Gilman Drive, Mail Code 0735, La Jolla, CA 92093-0735
858-245-7400 (Office) 858-534-0972 (Fax)
October 19, 2018

Dear Professor Anderson:

As the Directors of the Center on Gender Equity and Health (GEH) at UC San Diego, we are pleased to provide this letter of support for the proposed School of Public Health at our institution. We are very pleased to see the development of a School of Public Health and have appreciated the opportunity to help shape its plans to include emphasis on gender equity and health, as well as population health, as key pillars of focus. As you know, these are key areas of focus for GEH as well, and we look forward to participating in the development of curricula and research foci of the new school, as well as several of our faculty anticipate holding primary or joint appointments with the new school.

Our mission at GEH focuses on improving population health and development by improving the status, opportunities and safety of women and girls, as well as the systems that serve them, globally. To achieve this mission and create sustainable and large-scale change, GEH seeks and maintains partnerships with governmental and non-governmental agencies around the globe. We utilize a social justice framework across these efforts, and employ innovative technologies to facilitate and accelerate change at individual, community and national levels. Our research is implemented across 15 countries, including the US, India, Bangladesh, Kenya, Niger, Uganda, Honduras, Mexico, Russia, and Swaziland. This work constitutes over 18 million dollars in current grant funding, through support from the National Institutes of Health (NICHD, NIMH, NIDA), the Centers for Disease Control and Prevention, the Bill and Melinda Gates Foundation, the David and Lucile Packard Foundation, and UNICEF.

Currently, there are 20 GEH faculty members across the School of Medicine, the School of Engineering and the Division of Social Sciences at UC San Diego, as well as two that hold primary appointments in Public Health and Social Work at San Diego State University. Nine of these faculty hold primary appointments in Infectious Diseases and Global Public Health at UC San Diego, and all have an interest in a primary or joint appointment with the developing school of public health. Many of these faculty already teach graduate and undergraduate courses related to public health, including courses on global health, maternal and child health, gender and health, gender-based violence, program evaluation, survey design, social epidemiology, and qualitative research methods.

We look forward to working with you on the development of our new school of public health.

Sincerely,

Anita Raj, Ph.D., MS
Tata Chancellor Professor of Medicine
Director, Center on Gender Equity and Health (GEH)
Professor of Education, Division of Social Sciences

Jay Silverman, Ph.D.
Professor of Medicine and Global Public Health
Director of Research, UCSD Center on Gender Equity and Health (GEH)
To the Review Committee:

As an economist who focuses on economics of health care and health policy, I am writing this letter to express my enthusiasm for the proposed School of Public Health (SPH).

Several members of UC San Diego’s economics faculty (Itzik Fadlon, Melissa Famulare, Karthik Muralidharan, Prashant Bharadwaj, and I) have research and teaching interests that intersect with public health in both the developed and developing country contexts. Economics faculty are unlikely to migrate to the school of public health for their primary appointments. I do, however, see the proposed school as a potential source of valuable teaching and research synergies.

With regards to teaching, there are two courses in the economics department that would be natural fits for MA candidates in the school of public health who have at least some prior training in economics. Specifically, these courses are ECON 140: Economics of Health Producers, and ECON 141: Economics of Health Consumers. Enrollment in these courses requires that students meet prerequisites that are modest, but sufficient to enable a rigorous curriculum. Melissa Famulare, our Vice Chair of Undergraduate Studies notes that enrollment pressures may, at some future date, necessitate that these courses be restricted to economics majors only.

With regards to advising, there is a long-running precedent for faculty in the department of Family Health and Preventive Medicine to join the dissertation committees of economics graduate students as external committee members. Although economics faculty are not regularly asked to participate on committees for students in the joint doctoral program in public health, I personally would be quite happy to do so if approached by students whose research overlaps substantively with my areas of expertise.

Finally, I look forward to taking advantage of the proposed school of public health’s efforts to bring together faculty with common research interests. There is some precedent on which economics faculty hope to build with respect to research collaboration with public health researchers on campus. In 2015,
for example, I collaborated with David Sommerfeld from the Department of Psychiatry to assist with an analysis of California’s Transitional Case Management Program, which aids in connecting recent parolees to mental health resources. This work was conducted with financial support from the state of California, which desired to use the output of our analysis to aid in future policy making. Prashant Bharadwaj frequently collaborates with Anita Raj and Jay Silverman at the Center on Gender, Equity, and Health. He is an investigator with Dr. Silverman on a grant studying fertility and marriage behaviors among adolescent women in Niger (BLAH), and has recently authored a paper with Dr. Raj and others at GEH on violence against women in India. Bharadwaj is also a faculty mentor with Dr. Raj under the FISP program for a post doc (Lotus McDougal) at GEH.

Please do not hesitate to follow up via phone or email if any additional information would be of use.

Sincerely,

Jeffrey A. Clemens

Jeffrey Clemens
October 12, 2018

TO: Cheryl A. Anderson, PhD
Professor
Chair, Department Family Medicine and Public Health

FROM: W. Dillmann, M.D.
Professor
Chair, Department of Medicine

RE: School of Public Health

Dear Cheryl,

As Chair of the Department of Medicine, I strongly support the establishment of the new School of Public Health (SOPH) at UCSD. This new SOPH can develop specific and unique focus areas related to global and public health initiatives. For example, related to global health, a focus on border health is very pertinent. With our proximity to Mexico and HIV/AIDS as well as tuberculosis are infectious diseases presenting regional and global healthcare threats. This work has already been started in the section of Global Public Health (GPH) within the Infectious Disease Division in the Department of Medicine (DOM) can be further expanded. Faculty members in GPH/DOM may choose to join the new school as faculty members or decide to stay with their current division in the department. The significant increase in Type 2 Diabetes presents another threat to global health and may be an additional focus for scholarly activities.

Related to public health, rapid changes are occurring in healthcare delivery and population management. An example of these changes is the new Medicare reimbursement structure, MACRA, an approach which requires population management. Furthermore with the strength in wireless and wearable technologies in the School of Engineering and CalIT2 a strong a unique focus can be developed in this area.

The new SOPH can foster specific activities that enable clinical, scholarly, and teaching activities in the areas of global and public health and has therefore strong support for its establishment from the Chair of the Department of Medicine and its faculty.

Sincerely,

W. Dillmann, M.D.
Distinguished Professor of Medicine
Chair, Department of Medicine

Department of Medicine
UC San Diego Health Sciences • 9500 Gilman Drive, #0671 • La Jolla, CA 92037
T: 858-822-3345 • F: 858-822-3344 • med.ucsd.edu
September 29, 2017

David Brenner, MD
Vice Chancellor of Health Sciences and Dean, School of Medicine
UC San Diego Health
9500 Gilman Drive MC 0602
La Jolla, CA 92039-0602

Dear Dr. Brenner,

I am writing to you today in support of establishing a School of Public Health at UC San Diego. As the Representative for the 52nd Congressional District, who has the great fortune of representing UC San Diego’s La Jolla Health Campus, I am proud of the impact and influence that UC San Diego has had on our city and region. As the university looks toward the future and to developing programs to help meet the needs of our communities, I support the university’s proposal to establish a School of Public Health (SPH) at UC San Diego.

The university’s existing and successful public health programs has laid a strong foundation for innovative approaches to public health education, research, and practice. Creating a School of Public Health in one of the strongest research areas of the country will provide unique opportunities for students and faculty to engage and partner with regional organizations such as UCSD Health and the Veterans Affairs/Department of Defense (VA/DOD) healthcare systems for the benefit of our community.

The importance of training our next generation of public health professionals is clear as we face the growing effects of climate change, address longstanding health threats from chronic diseases, as well as emerging concerns such as the recent Hepatitis A, Zika and Ebola outbreaks, the rise of antimicrobial resistance, and environmental pollutants. The UC San Diego School of Public Health will be in a strategic position to collaborate with the VA/DOD to provide educational, research, and service opportunities for our military families and veterans and address issues such as mental and behavioral health, suicide, and homelessness.

UC San Diego is well positioned to ensure that a School of Public Health will have a positive impact on our region, as well as having numerous prospects for the campus to collaborate with the public and private sectors. Should you have any additional questions, please do not hesitate to contact Hannah Stern of my staff at Hannah.Stern@mail.house.gov or (858) 455-5550.

Sincerely,

Scott Peters
Member of Congress

SP/hs
September 29, 2017

David Brenner, MD
Vice Chancellor of Health Sciences and Dean, School of Medicine
UC San Diego Health
9500 Gilman Drive MC 0602
La Jolla, CA 92093-0602

Dear Dr. Brenner:

On behalf of the City of San Diego, I am pleased to support the proposal to establish a School of Public Health at University of California, San Diego. The institution is ranked among the top ten public universities in the U.S and we are proud of the impact and influence that UC San Diego has had on our city and region.

The university’s existing and successful public health programs have laid a strong foundation for new approaches to public health education, research and practice. Creating a School of Public Health in one of the strongest research areas of the country will provide unique opportunities for students and faculty to engage and partner with regional businesses and the public and private sectors for the benefit of our community.

The School of Public Health is needed to better address the health problems in our region, state, nation and globe as we face the growing effects of climate change and longstanding health threats. The School of Public Health will also allow us to tackle emerging concerns such as the recent Hepatitis A, Zika and Ebola outbreaks and the rise of antimicrobial resistance, food scarcity and environmental pollutants.

I believe the UC San Diego School of Public Health will complement and build on the efforts of existing public health schools and support the project.

Sincerely,

Kevin L. Faulconer
Mayor

KLF:ag
September 29, 2017

David Brenner, MD
Vice Chancellor of Health Sciences and Dean, School of Medicine
UC San Diego Health
9500 Gilman Drive MC 0602
La Jolla, CA 92093-0602

Dear Dr. Brenner:

As a San Diego County Supervisor representing the Fourth District that encompasses UC San Diego and its two academic medical centers, I can faithfully say that you are an integral partner of our mutual endeavor to improve the health of our region’s residents. As the university looks toward the future and to developing programs to help meet the needs of our region’s many communities, I wholeheartedly support your proposal to establish a School of Public Health (SPH).

The university’s existing public health programs have rapidly evolved, laying a foundation for innovative approaches to public health education, research and practice. Creating a School of Public Health in one of the nation’s most robust centers of research will provide unique opportunities for students and faculty to engage with regional businesses and civic leaders for the benefit of our community.

The SPH would be a strategic step forward in addressing public health problems for our local region – as well as those across the state, nation and globe – by expanding the number of professionals expressly equipped to address these needs. The importance of training this new generation of public health workers cannot be understated as we face the growing effects of climate change, health threats from chronic diseases, as well as emerging concerns such as the recent Hepatitis A and Zika outbreaks along with worries about Ebola and environmental pollutants. I strongly believe the UC San Diego School of Public Health will complement and build on the efforts of existing public health schools.

I am excited about everything this project could bring our region, and am fully supportive of adding a School of Public Health to the acclaimed University of California, San Diego. Please do not hesitate to contact me at (619) 531-5544 with any questions.

Sincerely,

RON ROBERTS
Supervisor, Fourth District
County of San Diego
David Brenner, MD
Vice Chancellor of Health Sciences and Dean, School of Medicine
UC San Diego Health
9500 Gilman Drive MC 0602
La Jolla, CA 92093-0602

Dear Dr. Brenner,

As a San Diego City Councilmember and representative for District 1, I am extraordinarily proud of the profound impact and influence that UCSD has had on our city and region. The institution is ranked among the Top 10 public universities in the U.S., and nearly 30 graduate and undergraduate programs are nationally ranked. As the university looks toward the future and to developing programs to help meet the needs of our communities, I enthusiastically support the university’s visionary proposal to establish a School of Public Health (SPH) at UC San Diego.

The university’s existing and successful public health programs have rapidly evolved and laid a strong foundation for innovative approaches to public health education, research and practice. Creating a School of Public Health in one of the strongest research areas of the country will provide unique opportunities for students and faculty to engage and partner with regional businesses for the benefit our community.

This is a crucial time in Southern California, and the SPH is critically needed to better address public health problems in our local region, as well as across the state, nation, and globe by expanding the number of professionals equipped to meet these needs.

The importance of training this new generation of public health workers cannot be understated as we face the growing effects of climate change, address longstanding health threats from chronic diseases that affect our population, as well as emerging concerns such as the recent Hepatitis A, Zika and Ebola outbreaks, the rise of antimicrobial resistance, food scarcity, and environmental pollutants. I strongly believe the UC San Diego School of Public Health will complement and build on the efforts of existing public health schools.
UC San Diego is well positioned to ensure that the SPH has a seismic impact on our region, as this project has numerous prospects for the campus to collaborate with the public and private sectors. I am excited about all this project brings to our region, and am fully supportive of bringing a School of Public Health to the acclaimed University of California, San Diego.

Please do not hesitate to contact me at (619) 236-6611 with any questions.

Respectfully,

Barbara Bry
City Councilmember, District 1
Thursday, September 28, 2017

UC San Diego Health
Office of the Vice Chancellor
for Health Sciences and
Dean, School of Medicine
9500 Gilman Drive
MC 0602
La Jolla, CA 92093-0602

Dear Vice Chancellor Brenner and esteemed colleagues at UC San Diego Health:

Here at Illumina, we believe that each day presents exciting new challenges, questions waiting to be answered, and innovations yet to be discovered. We understand the importance of bright, driven and accomplished people and believe they are an integral part to our mission of transforming human health and driving scientific innovation.

We believe UC San Diego’s proposed School of Public Health will greatly benefit our community and help accelerate public health education, research and innovation within the San Diego area and beyond. The UCSD School of Public Health can help better address crucial public health issues by expanding the number of professionals equipped to meet this need through high-caliber interdisciplinary training in the field of public health.

San Diego has quickly become one of the leading high-tech hubs in the U.S., with strengths in biotechnology and life sciences as well as health and information technologies. At Illumina, we believe science, technology, engineering and math (STEM) education is vital to accelerating breakthroughs to improve human health. Openness and collaboration are vital to such breakthroughs. The School of Public Health can help integrate UCSD’s already established excellence in traditional areas of public health while setting a new standard for educating a workforce prepared to address current and future public health problems. We believe the proposed School of Public Health will strengthen UC San Diego as a teaching and research institution, while responding to the critical shortage of public health professionals.

On behalf of Illumina, we express our full support of the proposed UC San Diego School of Public Health.

Sincerely,

[Signature]

Jay Flattley
Executive Chairman
September 27, 2017

David A. Brenner, MD
Vice Chancellor, Health Sciences
Dean, School of Medicine
University of California, San Diego
9500 Gilman Drive, MC0602
La Jolla, CA 92039-0602

Dear Dr. Brenner:

I am pleased to provide our full support of the UC San Diego's proposal to establish a School of Public Health.

Rady Children's is the only pediatric health care system in America which serves more than ninety-two percent of the children in its community. Our affiliation with UCSD and the launch of the Rady Children's Institute for Genomic Medicine provide a unique opportunity for UCSD to strengthen its teaching and research missions as it develops public health professionals with the skills and training necessary to address the challenges and opportunities in our evolving healthcare environment. I am confident that the proposed interdisciplinary training program will train first rate public health professionals and we are eager to be a partner.

Our global mission is "To restore, sustain and enhance the health and developmental potential of children through excellence in care, education, research and advocacy," and in partnership with the UCSD School of Public Health, we will further this aim. As the largest children's hospital in California and the only children's hospital in this region, our hospital provides access to a large and diverse patient population. The UCSD School of Public Health will be a tremendous asset as it prepares the next generation of professionals to address the complex and unique needs of the pediatric population in our community and the nation.

If you have any questions, I would welcome the opportunity for further discussion.

Sincerely,

Donald B. Kearns, MD, MMM
September 29, 2017

David A. Brenner, MD
Vice Chancellor for Health Sciences and
Dean, School of Medicine
UC San Diego Health
9500 Gilman Drive
MC0602
La Jolla, CA 92093-0602

Dear Dr. Brenner,

I am writing to express my enthusiastic support for the proposed UC San Diego School of Public Health. As President of the nonprofit Sanford Burnham Prebys Medical Discovery Institute, I am responsible for overseeing the Institute’s academic and scientific activities, which blend basic biomedical research and expertise in drug discovery with the goal of developing innovative therapeutics for the prevention and treatment of human disease. As a professor at the Institute’s NCI-designated cancer center, my own research program seeks to identify the molecular mechanisms behind cancer metastasis.

As a scientist and administrator on the Mesa for more than 20 years, I have been invigorated and inspired by the growth of biomedical research and discovery happening in our community — in the academic, private and public sectors — and the impact they are having around the world. Yet, as our pace of medical discovery is accelerating, so is our need for a skilled and dynamic public health workforce capable of addressing both chronic health conditions and emerging or resurging threats, such as the recent hepatitis A outbreak, within a diverse population ecosystem.

In addition to training a new generation of public health professionals, the proposed UC San Diego School of Public Health offers a unique opportunity to catalyze new collaborations among health researchers and practitioners, technologists, data scientists, and environmental and policy experts across the UC San Diego campus with an eye toward population health and wellness. I am also enthusiastic about the possibilities for partnership and collaboration with other area researchers, including leaders at Sanford Burnham Prebys Medical Discovery Institute who are actively engaged in a wide range of health-related studies from the genetic underpinnings of cancer, heart disease and neurodegeneration to new treatment avenues for infectious and metabolic disease. The new school will be a welcome complement to existing public health and biomedicine efforts and further enrich a dynamic community that continues to be a model for world-class research and collaboration not only in California, but across the country.

Sincerely,

Kristina Vuori, M.D., Ph.D.
President
Professor, NCI-designated Cancer Center
Pauline & Stanley Foster Presidential Chair

T 858.646.3100  10901 N. Torrey Pines Road, La Jolla, CA 92037 SBPdiscovery.org
Human Health and the Oceans

A pan-institutional initiative

WHITE PAPER
22 March 2017
Introduction
A major university research and educational initiative is greatly needed to integrate the complexities of ocean and atmospheric sciences with environmental issues affecting human health. This University of California San Diego initiative will be the first in the world operated on the premise that discoveries leading to advances at the intersection of human health and ocean sciences are essential to enhance protection and understanding of both.

The experience, expertise, and commitment of UC San Diego Health Sciences and UC San Diego Scripps Institution of Oceanography in physiology, medicine, pharmacology, organic chemistry, microbiology, genomics, bioengineering and marine science identify San Diego as the ideal location for this enterprise. San Diego is home to a critical mass of medical specialists, marine researchers, and engineers with excellent access to biotech and pharmaceutical industry pipelines, and simultaneously offers expedient ocean, coastal, and estuarine access.

Through education, community partnerships, interdisciplinary training, collaborative research, and the translation of research into practical applications, UC San Diego will become the global leader in understanding and protecting our marine environment and its effect on human health in support of Human Health and the Oceans – “H2O”

This UC San Diego initiative is a research-focused, education-oriented, collaborative pan-institutional partnership integrating the expertise of the interdisciplinary medical fields with the marine science and engineering communities to promote Human Health and the Oceans.

Purpose
To create knowledge and improve understanding at the intersection of human medicine and ocean health in coastal communities through evidence-based medical practice, therapies, research, and education.

Mission
In support of “Human Health and the Oceans”, UC San Diego emphasizes support of research, education, and training throughout its campuses and centers to increase and apply knowledge of the inherent interconnectivity of oceans and human health.

Vision
To become the premier global academic leader in the discipline of ‘human health and the oceans’ at the intersection of medicine and ocean sciences.

Goals
• To advance a global agenda to pursue cutting-edge, innovative research and training in medicine and ocean sciences building a complementary bridge between the medical and marine science communities with input from engineering and physical sciences.
• To provide practical and evidence-based medical and ocean health information to the global community through research, education, and training.
To promote "Human Health and the Oceans" as a combinatorial effect towards improving health and the interconnectivity with ocean environments.

Services
UC San Diego possesses an international, interdisciplinary team of subject-matter experts who conduct research using best practices around the specific focal area of human health and ocean science to drive knowledge-based results, including provision of the following:

- Support services and subject matter expertise for health and ocean research worldwide.
- Guidance, consultation and dissemination of scientific knowledge through lectures, social media, web-based educational formats, museum exhibits, and other media commentary.
- A cross-cutting international platform at the intersection of education, training and research
- Peer-reviewed and popular publications, organization of interdisciplinary workshops and symposia on medical and marine science topics as they relate to Human Health and the Oceans.
- Graduate-level and undergraduate teaching and seminars in human health and marine science as integrative learning opportunities for UC San Diego with opportunities to launch UC San Diego projects in medicine and ocean sciences.
- A “Citizen Scientist” program that coordinates projects to census and monitor "Human Health and the Oceans."
- Coordination and administration of the H2O Research Council charged with provision of relating information to agencies and the public for purposes of prevention and education, and UC San Diego intramural coordination of cross-cutting research projects.

Strategic Planning
UC San Diego research communities have expressed strong interest. Drs. Bradley Moore and William Gerwick, with support and encouragement from Vice Chancellor Margaret Leinen, have compiled input from successful thought leaders around campus as an indispensable element of the H2O development process. A strategic planning workshop is envisioned to take place during late spring 2017, which will help establish direction and explicit goals for UC San Diego H2O. From this and other input will be derived the first 5-year strategic plan.

Research Projects
Potential future UC San Diego H2O projects will be contingent upon findings and priorities from the H2O strategic planning workshop, as well as interest and funding. Initial interests might include the following:

- Human health research in further reducing risks of serious illness from ocean and atmospheric pathogens and toxicants in coastal communities, and understanding potential benefits of exposure to beneficial chemicals and microbes found in the oceans;
- Development of new marine-based medicines, with a specific emphasis in infectious diseases, poorly treated cancers, and a host of contemporary diseases such as
neurodegeneration and neglected tropical diseases;
• Consequences of ocean and climate changes on human health;
• Design and construction of ocean-inspired biomedical materials and remedies;
• Impact of marine aerosols and water quality on human health in tropical, temperate and polar regions;
• Citizen Scientist projects and new projects that emerge from training initiatives and ongoing workshops.

Collaborators
Leveraging intellectual resources and forming interdisciplinary networks will validate UC San Diego’s vision to earn national recognition for worldwide leadership in human health and the oceans. UC San Diego will become a national and international bridge from the medical communities to the marine science and engineering communities.

Federal funding agencies: NIH, NSF, EPA, USCG, DOD, etc.
State funding agencies: California Sea Grant, etc.
Foundations: Bill and Melinda Gates Foundation, Gordon and Betty Moore Foundation, etc.
Collaborative partnerships: NOAA, NASA, EPA, CDC, etc.
International collaborations and partnerships: Ningbo, Qingdao, Shanghai area universities and institutes; University of Queensland; European Science Foundation, etc.

Founding Participants
1. Committed UC San Diego research and clinical faculty in support of H2O:
   Bradley Moore, SIO and SSPPS
   William Gerwick, SIO and SSPPS
   Michael Lang, SOM
   Karen Van Hoesen, SOM
   James McKerrow, SSPPS
   Robert Tukey, Pharmacology
   Terry Gaasterland, SIO and IGM
   Pieter Dorrestein, SSPPS
   Amro Hamdoun, SIO
   Rob Knight, SOM-Pediatrics and CSE
   Paul Jensen, SIO
   James Golden, Biological Sciences
   Michael Gilson, SSPPS
   William Fenical, SIO
   Ron Burton, SIO
   Wael Al-Delaimy, SOM-Public Health
   Kim Prather, Chemistry/Biochemistry and SIO
   Vicki Grassian, Chemistry/Biochemistry, Nanoengineering, and SIO
   Eric Allen, SIO and Biological Sciences
2. UC San Diego Centers, ORUs, and Departments, that have educational, clinical and research goals in human health and oceans:
   - Center for Marine Biotechnology and Biomedicine
   - Center for Oceans and Human Health (NIH/NSF funded)
   - Center for Aerosol Impacts on Climate and the Environment (NSF funded)
   - Center for Marine Biodiversity and Conservation
   - Center for Drug Discovery Innovation
   - Center for Discovery and Innovation in Parasitic Disease
   - Center of Excellence in Diving – Emergency Medicine
   - Center for Microbiome Innovation
   - Superfund Research Center (NIEHS funded)
   - Collaborative Mass Spectrometry Innovation Center
   - UC San Diego Drug Development Pipeline
   - Center for Computer-Aided Drug Discovery
   - Clinical Translational Research Institute (CTRI)
   - Moores Cancer Center
   - Institute for Genomic Medicine

**Synergies**

Synergies already exist between schools and departments through joint faculty appointments, cross-disciplinary graduate programs, and interdepartmental Centers. With ongoing emphasis at UC San Diego on joint faculty hires that naturally create interdepartmental synergies, the timing is ideal to capitalize on these to create additional new synergies at the Human Health and the Oceans interface. Joint hires already exist between SIO, SSPPS, SOM, Division of Biology, Department of Chemistry/Biochemistry, Bioengineering, and IEM.

**Graduate Education in H2O**

Graduate training in marine sciences for improving health will provide the next generation of H2O scientific experts, and facilitate new H2O research programs at UC San Diego with national and global partners.

- Graduate Training Program in 'Pharmaceutical Sciences and Drug Development' (PSDD) with the umbrella Biomedical Sciences graduate program at UC San Diego Health Sciences, a new program recently launched in summer 2016, includes marine natural products for therapeutics development. See [http://biomedsci.ucsd.edu/training-areas/pharma-sciences-drug-dev.html](http://biomedsci.ucsd.edu/training-areas/pharma-sciences-drug-dev.html)
- SIO Graduate Program Initiatives to link marine sciences education with that of the health sciences graduate program disciplines at UC San Diego.
- T32 Training Grant Programs to support interdisciplinary oceans and health sciences graduate research training in: (a) drug discovery and development, (b) environmental toxicology, (c) ocean qualities in changing environments for health, and (d) others. These areas involve ongoing T32s and new T32 programs.
• New Graduate Courses for Cross-Disciplinary H2O and Health Sciences Training. The PSDD graduate training program is developing the following new courses involving marine sciences and human health: (a) ‘Principles of Pharmaceutical Sciences and Drug Development’ (PPSDD), 2018; (b) PSDD Seminar Series, highlighting marine sciences for drug development and health, 2018; (c) Analytics Workshop in PSDD, laboratory hands-on training in marine sciences for drug development, analytics for PSDD disciplines, 2018-2019. These graduate courses will be open to all graduate students at UC San Diego, and bring together trainees from across disciplines in biomedical sciences, marine sciences, chemistry/biochemistry, computer sciences and engineering, bioengineering, neurosciences, and related.

UC San Diego Human Health and the Oceans Initiative

Resources
Resources are needed for Phase 1 planning, start-up, development, infrastructure, and identification of pilot projects with initial seed funding to be requested from Vice Chancellors M. Leinen and D. Brenner and/or Chancellor P. Khosla. Chief amongst the Phase 1 resource needs is the hiring of a dedicated executive administrator to spearhead this H2O effort. The skills, experience, and selection criteria needed for such an individual are as follows:
• PhD with recent science and research background;
• Preferably expertise in both health science and marine science;
• Experience conceiving, managing and growing a pan-institutional/commercial research program;
• Demonstrated and articulate ability in writing and editing;
• Demonstrated public and scientific speaking track record.

Additional Phase 1 funds will be sought to nucleate new cross campus H2O projects that will accelerate joint scientific research between biomedical and ocean science faculty and to also importantly build community at UC San Diego. Preliminary data generated in the H2O pilot grants will form the basis of new applications for NIH translational grants.

**Timeline**

Year 1:
• To hire and have in place an executive administrator by June 1 in time for the campus H2O symposium tentatively set for June 5 or 6, 2017 at the Scripps Seaside Forum.
• To develop and outline a NIH Center Program grant.
• To advertise and compete a H2O pilot grant program.
• To assist in building a campus-wide marine chemical library.
• To build and activate a high quality H2O website.

Year 2:
• To award pilot H2O grants.
• To develop and outline a NIH Center Program grant.

Yearly:
• To support community outreach efforts to educate the public about H2O vision and goals.
• To actively network and fundraise in the H2O space.
A New Type of Heat Wave

Heat waves in California and Nevada are traditionally dry and tolerable. The temperature warms up during the day and normally cools off greatly at night allowing plants and animals to recuperate and get ready for another day of scorching heat. However, this traditional type of heat wave, natural for our semi-arid Mediterranean climate, has increasingly tended to be more humid and more often accentuated at night since the 1980s (Figure 1). Humidity, that is water vapor in the air, absorbs infrared radiation emitted by the earth’s surface hampering the ability of the surface to cool off. In short, humidity leads to higher night-time temperatures. Humidity makes the difference between cool desert and sultry bayou nights. Increased humidity also makes extreme heat much more difficult for humans as it reduces our bodies’ ability to cool off by evaporating water — sweating. Humid heat waves start off with higher temperatures in the morning and tend to reach higher temperatures during the day, lasting longer than their dry counterparts. The observed trend towards more humid, more intense and longer-lasting heat waves in California has so far culminated in the July 2006 heat wave, an event of unprecedented impact on human health in the state (see box). Californian plants and animals are not acclimated to persistent humid heat, making them more likely to succumb. Great heat waves are rare. Heat waves impacting California are caused by a specific weather pattern characterized by high atmospheric pressure in the Great Plains and low pressure off California's coast which together draw warm moist air from the south. Coastal waters west of Baja California are an important source for this humid air; these waters have become unusually warm in recent decades as part of a global warming pattern. This ocean warming has been partially responsible for the fact that the rare weather patterns associated with great California heat waves have tended to bring warmer, more humid air.

California, occasional great heat waves punctuate an increasing trend in heat wave activity observed since around 1980 (Figure 1). These heat waves have changed from the traditional dry daytime-accentuated heat waves in the summers of 1959, ’60, ’61, ’72, ’81 to the humid nighttime-accentuated heat waves of 1999, ’96, 2003, and ’06. The trend towards nighttime-accentuated humid heat waves has continued in summers 2012 and ’13, although we have not seen a heat wave of 2006 magnitude since.

2006 HEAT WAVE & HEALTH

The 2006 California heat wave killed more than 600 people, 147 directly by hyperthermia, and resulted in over 1,200 hospitalizations and 16,000 emergency-department visits. Most of the deaths from hyperthermia occurred in inland counties, which were the hottest, while the highest morbidity (illness) was along the highly vulnerable coast (discussed on back). The 2006 heat wave also had grave effects on ranching and agriculture, ecosystems and the energy sector. In severe drought years, like this one, a great heat wave could additionally exert significant stress on water resources.


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Heat Waves, Climate Change & Coast

In future climate projections, heat wave activity increases throughout California as the climate warms. The number of heat waves, relative to present day thresholds, would increase 4-8 fold in their daytime and 5-10 fold in their nighttime temperature expressions by end of century (Figure 2), depending on how much greenhouse gas is emitted into the atmosphere. Heat waves will not only occur more frequently, but they will be more intense and longer-lasting. Climate change will also bring a disproportionate increase in humid heat waves in California expressed more strongly in minimum or nighttime temperatures. When using temperature thresholds that evolve along with the warming climate, heat waves are expected to become more extreme along the coast relative to other parts of the state (Figure 3). This is supported by observations along the coast where heat wave activity has already outpaced summertime warming and resulted in disproportionate health impacts of recent heat waves.

![Image of heat wave frequency projections](image)

**Figure 2.** The two figures show the projected increase in the frequency of heat waves in Sacramento during June, July and August using minimum (top) and maximum (bottom) temperatures. The color symbols highlight the projected changes at 2050, 2090 and 2100. The lighter colors represent greenhouse gas emissions that level off by the end of the century (RCP 4.5) whereas the darker colors show the projections under greenhouse gas emissions that accelerate throughout the century (RCP 8.5), the business as usual scenario.

Most Californians reside in coastal counties where they are least acclimated to extreme heat and many lack air conditioning. Marine influence, in particular via marine layer clouds, typically cools the coast during the peak of summer. During some heat waves (e.g. July 2006), marine layer clouds are absent, leading to the strongest temperature spikes and the strongest health impacts along the coast.

The summer of 2014 was the warmest summer in California’s history, though no major heat wave occurred. Continued warming, particularly of the coastal ocean near Baja, is priming the region for a major humid event of 2006 magnitude raising the odds for record-breaking heat, especially if the requisite weather pattern occurs at the peak of summer in late July – early August. The weather pattern responsible for large-scale California heat waves is challenging to predict at lead times longer than about a week leaving uncertainty as to what might occur this summer.

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- **CNAP**, the California Nevada Applications Program, is a NOAA RISA team conducting applied climate research that is inspired by and useful to decision makers in the region. [cnap.ucsd.edu](http://cnap.ucsd.edu)
- **NWS**, the National Weather Service, provides real-time forecasts and notification of heat waves and collects observation data used by decision makers and researchers. [www.weather.gov](http://www.weather.gov)
- **Climate Education Partners**, an NSF-CCSF funded alliance providing locally relevant climate science to regional leaders can make informed decisions about San Diego’s future. [www.sandiego.edu/climate](http://www.sandiego.edu/climate)
- The **SW CSC**, Southwest Climate Science Center, sponsored by the US Department of the Interior, provides scientific information, tools, and techniques to anticipate, monitor, and adapt to climate change. [www.swcsc.arizona.edu](http://www.swcsc.arizona.edu)
- **CW3E**, Center for Western Weather and Water Extremes, provides science to support effective policy on extreme weather and water events. [cw3e.ucsd.edu](http://cw3e.ucsd.edu)
EXECUTIVE SUMMARY

Ten scalable solutions for carbon neutrality and climate stability
This Executive Summary should be cited as follows:


The authors acknowledge senior editor Jon Christensen of UCLA, for help with editing and for improving the readability of this executive summary.
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FOREWORD

1. Seizing the Moment

Climate change is scientifically incontrovertible. What the world urgently needs now are scalable solutions for bending the curve — flattening the upward trajectory of human-caused greenhouse gas emissions and consequent global climate change.

This executive summary of the full report, *Bending the Curve: 10 scalable solutions for carbon neutrality and climate stability*, presents pragmatic paths for achieving carbon neutrality and climate stability in California, the United States and the world. More than 50 researchers and scholars — from a wide range of disciplines across the University of California system — formed a climate solutions group and came together in recent months to identify these solutions, many of which emerge from UC research as well as the research of colleagues around the world. Taken together, these solutions can bend the curve of climate change. The full report will be published in spring 2016 after peer review.

This report is inspired by California’s recent pledge to reduce carbon emissions by 40 percent below 1990 levels by 2030, and by the University of California’s pledge to become carbon neutral by 2025. What is taking place in California today is exactly the sort of large-scale demonstration project the planet needs. And this statewide demonstration project is composed of many of the kinds of solutions that can be scaled up around the world.

Over the past half century, California has provided a remarkable example for the world by achieving dramatic reductions in air pollution, while continuing to grow economically. In this report, we propose a set of strategies for combating climate change and growing the economy in California, the nation and the world, while building present-day and intergenerational wealth, and improving the well-being of people and the planet.

The University of California has played a key role in California’s pioneering leadership in energy and environmental policy through research, teaching and public service, and currently is partnering with local, state, federal and international leaders in the public, private and philanthropic sectors to address our pressing climate change challenges. We still have much more to do here in California. We are eager to share these lessons with the world at the upcoming global climate summit in Paris, and together build a better, safer, healthier and more equitable world, while bending the curve of climate change.

As we make the changes necessary to achieve carbon neutrality at the University of California, employing solutions that can be scaled up to developing energy and climate solutions for the world, hundreds of thousands of faculty, students and staff across our 10 campuses and three affiliated national laboratories will be learning and sharing with the world how we can bend the curve of greenhouse gas emissions and stop global warming through taking bold yet pragmatic steps and lowering the barriers so others can follow.
II. We Are at a Crossroads and We Must Make a Choice

Climate change is real and it is happening now.

This is evident in the increased frequency and intensity of storms, hurricanes, floods, heat waves, droughts and forest fires. These extreme events, as well as the spread of certain infectious diseases, worsened air pollution, drinking water contamination and food shortages, are creating the beginning of what soon will be a global public health crisis. A whole new navigable ocean is opening in the Arctic. Sea levels are rising, causing major damage in the world’s most populous cities. All this has resulted from warming the planet by only about 0.9 degrees Celsius, primarily from human activities. Since 1750, we have emitted 2 trillion metric tons of carbon dioxide (CO₂) and other greenhouse gases. The emission in 2011 was around 50 billion tons and is growing at a rate of 2.2 percent per year. If this rate of increase continues unabated, the world is on target to warm by about 2 degrees Celsius in less than 40 years. By the end of the century, warming could range from 2.5 degrees Celsius to a catastrophic 7.8 degrees Celsius. We are transitioning from climate change to climate disruption. With such alarming possibilities the planet is highly likely to cross several tipping points within decades, triggering changes that could last thousands of years. All of this is occurring against a backdrop of growing needs and pressures by humans, as our population is set to increase by at least 2 billion people by 2050.

For the full document visit: http://uc-carbonneutralitysummit2015.ucsd.edu/_files/Bending-the-Curve.pdf