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July 22, 2015

MEMORANDUM

TO: State Board of Regents

FROM: David L. Buhler

SUBJECT: University of Utah – Doctor of Philosophy in Population Health Sciences with Emphases in: 1) Biostatistics, and 2) Health Systems Research

Issue

The University of Utah (UU) requests approval to offer a new Doctor of Philosophy (Ph.D.) in Population Health Sciences with two areas of emphasis that include: 1) Biostatistics, and 2) Health Systems Research, effective Fall Semester, 2016. The UU's Board of Trustees approved the program April 14, 2015.

Background

The proposed program will guide students in developing the methodological expertise and collaborative skills required to assume leadership roles in cross-disciplinary research areas. Historically, departments within the School of Medicine have followed a traditional structure of aligning along defined specialties, functions, and educational requirements. The introduction of the Ph.D. in Population Health Sciences and its emphases in Biostatistics and Health Systems Research represents a shift in this paradigm to more cross-training and research.

The Biostatistics Emphasis will produce researchers with methodological and collaborative expertise to drive healthcare transformation and quantitative health science research. The Health Systems Research Emphasis will produce researchers whose work furthers the efficiency, value, and quality of health care for Utah, the United States, and the global population.

The proposed program is designed to complement, strengthen, and extend the capacity for scholarship throughout the University. The emphases in biostatistics and in health systems research will constitute the only Ph.D. level programs in these disciplines in the state of Utah.

The UU's new Department of Population Health Sciences (approved by the Board of Regents in 2014) will administer this new program. The UU considers this department as the cornerstone for transforming the University's $2.1 billion healthcare system. The objectives of the Population Health Sciences Ph.D. program are aligned with strategic ongoing initiatives at the University of Utah Health Sciences Center. These statregic initiatives focus on improving health care quality and strengthening value-based outcomes. It is anticipated that this program will prepare graduates to shape and foster data-driven quality healthcare in Utah as well as other parts of the country and internationally.

The demand for students trained in the curriculum outlined in this proposal is high and the current supply of qualified individuals is inadequate. The national shortage of biostatisticians with graduate training is documented in the Center for Disease Control's Health *Objectives for the Nation* publications and the *Seventh Report to the President and Congress on the Status of Health Personnel in the United States* (http://eric.ed.gov/?id=ED319999). Similarly, the institution reported that Academy Health, a nonpartisan, not-for-profit, health services research and policy organization has documented a lack of researchers prepared to take on positions addressing current and future needs of the evolving healthcare system. At the time of this writing Academy Health's career page (http://www.academyhealth.org/Training/content.cfm?ItemNumber=964&navItemNumber=2021) showed nearly 40 open positions for biostatisticians and health systems researchers across the country.

Host departments of educational activities and programs within the University Health Sciences Center (HSC) receive funds through a formula developed and administered by the HSC Mission Based Management (MBM) Office and the School of Medicine Executive Committee. This proposed program will be initially supported by state appropriated funds allocated by the HSC. As the program matures, the HSC allocation will be amended to include Population Health Sciences so the department will then receive funding based on the MBM funding formula. It is estimated that by year eight the program will be sustainably funded through a combination of student differential tuition (if approved) and the applicable MBM formula. Additionally, the institution anticipates grant and contract funding will contribute to some program costs.

To meet the anticipated needs of the department and this new program, the UU anticipates hiring an additional seven full-time faculty members within the next few years. Costs to cover these faculty additions is part of the overall strategy of the new Population Health Sciences Department and will be covered through the funding model described herein.

Policy Issues

The proposed program has been developed and reviewed through established institutional procedures and Board of Regents policy. Chief academic officers as well as faculty in related departments from the Utah System of Higher Education institutions have reviewed the proposal and have provided input. There are no additional policy issues that need to be addressed relative to approval of the program.

Commissioner's Recommendation

The Commissioner recommends the Board of Regents approve the Doctor of Philosophy in Population Health Sciences with Emphases in Biostatistics and Health Systems Research.

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David L. Buhler
Commissioner of Higher Education

DLB/BKC
Attachment

Program Description – Full Template
University of Utah School of Medicine
Ph.D., Population Health Sciences

Section I: The Request

The University of Utah (U of U) requests approval to offer a new Doctor of Philosophy in Population Health Sciences with two areas of emphasis that include: 1) Biostatistics, and 2) Health Systems Research, effective Fall Semester, 2016. The U of U's Board of Trustees approved the program April 14, 2015.

Section II: Program Description

Complete Program Description

The Population Health Science Ph.D. program will focus primarily on the development of the rigorous methodological expertise required to conduct high impact research to improve the delivery of care to patient populations. The Population Health Sciences degree program will produce academic researchers with emphases in Biostatistics and Health Systems Research. The Biostatistics Emphasis will produce researchers with methodological and collaborative expertise to drive healthcare transformation and quantitative health science research. The Health Systems Research Emphasis will produce researchers whose work furthers the efficiency, value, and quality of health care for Utah, the United States, and the global population.

By creating common courses between the two emphases, this Ph.D. program will instill from its onset the concept of team science and collaboration. Students in both Biostatistics and Health Systems Research will have broad understanding of the issues in current healthcare delivery, and will work together to improve the breadth of research. Collaboration with the Cancer Control and Population Sciences (CCPS) Program of the Huntsman Cancer Institute will provide students with the opportunity to develop these skills in the setting of cancer research. This program will be a model for team-based science in the workplace. Students will learn in an integrated and collaborative environment and be able to make an immediate impact on health care research and transformation upon graduation from this program.

Purpose of Degree

The structure and curriculum of the Ph.D. in Population Health Sciences as well as the integrated approach between the emphases in Health Systems Research and Biostatistics is unique. This program will cultivate the scholarship required to impact healthcare delivery. Population Health Sciences will educate students in content and methodology to advance health science research.

Institutional Readiness

The new Department of Population Health Sciences in the School of Medicine was approved by the Utah State Board of Regents on May 16, 2014. An interim chair was appointed in August 2014 and initial faculty members have been recruited. The proposed degree will provide opportunities to engage, rather than compete with, other departments and colleges across the University to strengthen collaborative scholarship in this academic area. This degree program will also be overseen and evaluated by an interdisciplinary external advisory board in order to maintain and uphold its collaborative mission.

The graduate program infrastructure in the Department of Population Health Sciences offers opportunities for collaborative research with clinician-scientists in the Health Sciences clinical departments as well as

other campus investigators. Similar to other School of Medicine basic science departments, the Population Health Sciences department leverages and connects the resources being deployed specifically to improve care delivery to patient populations.

Departmental Faculty

Department Faculty Category	Dpt Faculty Headcount – Prior to Program Implementation	Faculty Additions to Support Program	Dpt Faculty Headcount at Full Program Implementation
With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)			
Full-time Tenured	3	7	10
Full-time Non-Tenured	X	6	6
Part-time Tenured	X	X	X
Part-time Non-Tenured	X	X	X
With Master's Degrees			
Full-time Tenured	X	X	X
Full-time Non-Tenured	X	X	X
Part-time Tenured	X	X	X
Part-time Non-Tenured	X	X	X
With Bachelor's Degrees			
Full-time Tenured	X	X	X
Full-time Non-Tenured	X	X	X
Part-time Tenured	X	X	X
Part-time Non-Tenured	X	X	X
Other			
Full-time Tenured	X	X	X
Full-time Non-Tenured	X	X	X
Part-time Tenured	X	X	X
Part-time Non-Tenured	X	X	X
Total Headcount Faculty in the Department			
Full-time Tenured	3	7	10
Full-time Non-Tenured	X	6	6
Part-time Tenured	X	X	X
Part-time Non-Tenured	X	X	X

It is anticipated that the majority of the departmental faculty members will be tenure line. The task of mentoring and teaching approximately 4 students per emphasis, per year, in the Ph.D. program will be performed by a combination of fulltime Population Health Sciences faculty members and qualified adjunct and graduate program faculty members from across the University of Utah. This will ensure that students have expert mentors for their dissertation topics. By giving students access to both internal and adjunct faculty members, the doctoral program in Population Health Sciences will foster an educational experience that will facilitate cross-disciplinary learning and develop graduates who are readily employable, fundable investigators.

Staff

Additional Department of Population Health Sciences staff at both the departmental and divisional levels will be in place prior to acceptance of students. At the department level, there will be an administrative manager, an administrative assistant or executive secretary, a grants and contracts officer, and an academic program manager. Divisional administrative and scientific support will be provided based on the specific needs of each division.

Library and Information Resources

Students in the Ph.D. program in Population Health Sciences will have full access to the facilities and staff of the Spencer S. Eccles Health Sciences Library (EHSL), and the Marriott and Quinney libraries. The librarians are experts at navigating the sphere of information sources, ideation, identifying and creating dissemination venues for outcomes, and most importantly, teaching these lifelong information skills to others. Librarians facilitate and produce exemplary research by providing access to existing cutting edge research, performing high-level literature searching and management for evidence synthesis, and teaching best practice discovery and management techniques. Librarians' expertise in information retrieval saves the provider and researcher tiThe EHSL has transformed to a vital collaboration space where teams and communities gather to share ideas, execute projects, create and innovate (educational design, devices, games, apps, etc.), and seek professional expertise from others, including librarians and staff.

Admission Requirements

Applicants for admission to the Ph.D. in Population Health Sciences will be recommended by the admissions committee of the Department of Population Health Sciences and approved by the Graduate School at the University of Utah. Applicants should have a demonstrated interest in population science research. It is anticipated that most applicants will have a master's or clinical doctoral degree, but compelling work experience, subject matter expertise, research or exemplary undergraduate coursework will be considered in lieu of a master's degree. The department also anticipates refining admissions requirements over time based on experience and a more defined applicant pool.

The following information must be submitted to the Graduate School via ApplyU:

1. Graduate Admission Application
2. Official transcripts of undergraduate and graduate coursework
3. Graduate Entrance Exam Scores (GRE reccomended, but others may be considered with consent of the Department of Population Health Sciences)
4. For international students, a Test of English as a Foreign Language (TOEFL) score
5. A current Curriculum Vitae
6. A Statement of Purpose (less than 1000 words) that includes research experience and interest and long term career goals
7. 3-5 letters of recommendation from individuals with knowledge of the applicant's potential for success in a doctoral program

Admission to the Ph.D. in Population Health Sciences will require:

1. Acceptance to the Graduate School at the University of Utah
2. A minimum GPA of 3.0 in all college and post-baccalaureate work
3. Availability of faculty mentor resources that match the student's research interest
4. TOEFL score of at least 550, if applicable
5. Interview with Department of Population Health Sciences faculty and approval by the admissions committee

6. Completion of departmental pre-requisites

Student Advisement

Academic counseling for Ph.D. students in the Department of Population Health Sciences will be coordinated by the department Academic Program Manager and Director of Graduate Studies. The Academic Program Manager will inform students of academic expectations and financial obligations. The Academic Program Manager will also advise students on course offerings, compliance with departmental course requirements, and graduation requirements, in order to stay on track and on time for graduation. All tuition benefit positions will be coordinated through the Academic Program Manager.

Faculty Advisement

Each student will be mentored by the faculty Director of Graduate Studies and will be matched with an individual faculty advisor. Meetings for advisors and their advisees will be scheduled at regular intervals throughout the academic year to ensure that each student will meet his/her advisors and maintain open lines of communications. Advisors will assist with career development, finding research and scholarship opportunities, selection of dissertation topic, and recruitment of dissertation committee members, among other topics.

Justification for Graduation Standards and Number of Credits

Each student must successfully complete all graduation requirements to be awarded the Ph.D. degree. These requirements include a minimum of 62 graduate credits for a Ph.D. in Population Health Sciences when students enter the program with a relevant master's degree; this includes a minimum of 18 dissertation hours. Students who enter the degree program without a relevant master's degree must complete a minimum of 80 credits, including a minimum of 18 dissertation hours. All students must pass a departmental qualifying examination during the Spring semester of their second year. All students must successfully defend a doctoral dissertation. The department's examination processes and dissertation evaluation are consistent with other Ph.D. programs at the University of Utah. Students must complete all coursework and dissertation within 7 years of admission. Any exceptions must be approved by both the Graduate School and department.

External Review and Accreditation

This Ph.D. program is novel in its approach and does not have an accrediting body. Instead, there will be an advisory board that will comprise qualified persons across the University of Utah, other health systems in Salt Lake City, industry leaders, and national leaders in healthcare research. Assembling an external advisory board will be a first priority of the permanent Chair of Population Health Sciences.

Projected Program Enrollment and Graduates; Projected Departmental Faculty/Students

Data Category	Current – Prior to New Program Implementation	PROJ YR 1	PROJ YR 2	PROJ YR 3	PROJ YR 4	PROJ YR 5
Data for Proposed Program						
Number of Graduates in Proposed Program	X	0	0	0	0	8

Total # of Declared Major in Proposed Program	X	8	16	24	32	32
Departmental Data – For All Programs Within the Department						
Total Department Faculty FTE *(as reported in Faculty table above)*	3	16	16	16	16	16
Total Department Student FTE *(Based on Fall Third Week)*		8	16	24	32	32
Student FTE per Faculty FTE *(ratio of Total Department Faculty FTE and Total Department Student FTE above)*		8:16	16:16	24:16	32:16	32:16
Program accreditation-required ratio of Student FTE/Faculty FTE, if applicable: (Provide ratio here:_____)						

Approximately 4 students per emphasis will be admitted in each of the first five years of the program. Student numbers will increase proportionally as additional emphases are established and approved.

Expansion of Existing Program

This is not an expansion of an existing academic program.

Section III: Need

Program Need

Population health and health services research expertise and successful scholarship already exist within the University of Utah, but there is an urgent need to broaden this knowledge and build on existing expertise in biostatistics, health systems research, and cancer population science. Cultivating these significant strengths will better equip the University to meet important challenges of evolving healthcare systems. The proposed Ph.D. in Population Health Sciences is designed to complement, strengthen, and extend the capacity for scholarship throughout the University of Utah. The emphases in biostatistics and in health systems research will constitute the only Ph.D. level programs in these disciplines in the state of Utah.

There is a significant need to make US health care delivery more value-driven and less complex and fragmented. Advanced healthcare scholarship produced by researchers in the Department of Population Health Sciences will enable healthcare transformation and improvement. By offering this degree program and recruiting established health sciences researchers to Salt Lake City, the University of Utah has the potential to become a flagship institution promoting and driving healthcare transformation in the United States. Recruitment of faculty to Utah will enrich the scholarship of a large number of existing graduate programs in addition to Population Health Sciences. The program will create a hub for education, investigation, and expertise in value-driven health services, cost, quality, outcomes, and health delivery systems research. It will also facilitate increased efficiency and effectiveness of clinical operations through population health management and quality improvement initiatives. The Ph.D. program will fulfill the University of Utah's commitment to the Utah State Legislature that the University will prepare its students to

meet the demands of a transforming health care system and have an immediate impact on the workforce and health care sector upon graduation. Through this Ph.D. program, the University of Utah can become the national leader in health system transformation and can continue to increase its impact on healthcare nationwide by disseminating innovative scholarly research and policy considerations.

Historically, departments within the School of Medicine have followed a traditional structure of aligning along defined specialties, functions, and educational requirements. The introduction of the Ph.D. in Population Health Sciences and its initial emphases in Biostatistics and Health Systems Research represents a shift in this paradigm to more cross-training and research. With increasing prominence of team-based scholarship, the distinctions along these traditional academic lines are becoming blurred, thus allowing for more collaborative approaches to the advancement of knowledge. Students completing a degree in Population Health Sciences at the University of Utah will be in a strong position to take advantage of this shifting paradigm. The program will provide opportunities for cross-institutional research and education in health systems and quantitative methods scholarship to meet the multi-faceted challenges of health care delivery in a multitude of decentralized, networked and collaboration based service systems.

In parallel, new practices, policies, and accreditation standards are promoting integrated health systems that rely on interdisciplinary partnerships. As more inter-professional approaches to learning, innovation, and care are adopted, the responsibility, accountability, and authority for safety, quality, efficiency and effectiveness of patient care are shifting away from an individual perspective to one that is focused on system-based solutions. Multiple elements, including the Affordable Care Act (ACA), are influencing the transformation of health care systems. Public and private clients and consumers are increasing the pressure on these health care systems to provide accurate and relevant data that report on quality of care, efficiency and value.

The Ph.D. in Population Health Sciences has been created to align with, and drive, the changing trends in healthcare delivery. The collaboration between health systems researchers and biostatisticians throughout the program exemplify team-based and collaborative research from inception. There will be seamless transition from students to professionals in the field to leaders in healthcare transformation, mirroring the shift in medicine towards multi- and trans-disciplinary collaboration.

Labor Market Demand

The cost and complexity of health care in the United States are unsustainable. Information on the value of health care as it relates to quality and costs is sometimes absent and often unreliable. The demand for leaders who have the expertise and skills to systematically address these problems and lead healthcare transformation remains unmet.

The demand for students trained in the curriculum outlined in this proposal is high and the supply is inadequate. The national shortage of biostatisticians with graduate training is documented in the *Objectives for the Nation* and the *Seventh Report to the President and Congress on the Status of Health Personnel in the United States*. Similarly, Academy Health, a nonpartisan, not-for-profit, health services research and policy organization has documented a lack of researchers prepared to take on positions addressing current and future needs of the evolving healthcare system. Currently there are nearly forty open positions for biostatisticians and health systems researchers across the country posted on Academy Health's career page. This number has been fairly constant over the past several months. This illustrates the urgency for moving forward with this uniquely designed program.

Student Demand

The Ph.D. in Population Health Sciences is a degree aimed specifically at the increased need to create a more efficient and effective healthcare system. This program will produce graduates with expertise in different concentrations in order to make an immediate impact on healthcare in the United States and beyond. This is a unique and innovative program unlike any other terminal degree program offered in Utah or in the Intermountain region. This Ph.D. is not a continuation of a traditional undergraduate degree. It allows candidates to be drawn from a variety of educational and professional experiences across and beyond health sciences disciplines.

This Ph.D. will provide students an opportunity to pursue Health Systems Research and Biostatistics in Utah while creating a core of healthcare scholarship and innovation at the University of Utah. As the biostatistics emphasis will constitute the sole doctoral program in biostatistics in the state of Utah, it can be expected to attract students who graduate from master's degree programs in statistics at the University of Utah, Utah State University, and Brigham Young University who wish to advance their education in biostatistics or related quantitative health science fields. During 2012-2014, an average of 3 graduates per year from the Brigham Young master's program went on to enter Ph.D. programs in either biostatistics or statistics. Approximately four University of Utah MSTAT students per year going back to 2012 have expressed interest in pursing this type of Ph.D. An increasing number of scholars are turning their attention to the field of Population Health Sciences and healthcare transformation. By providing the program to educate researchers in this field, students and faculty alike will find an academic home for their research interests.

Similar Programs

The Public Health discipline is related to but different from the academic scope of this proposed department in important ways. Along with the University of Utah's Division of Public Health in the Department of Family and Preventive Medicine, there are several other accredited academic public health units in the Intermountain region. In Utah, both Brigham Young University and Westminster College have graduate public health programs. In the surrounding states, there are public health units in Colorado (University of Colorado, School of Public Health), Nevada (both University of Nevada Reno and University of Nevada Las Vegas have Schools of Community Health Sciences), and Idaho (Idaho State Public Health Program). Oregon State University has a School of Biological and Population Health Sciences that follows a traditional public health model with a multi-disciplinary approach linking biology and behavior to population and environmental health. The distinction between the proposed program and these other programs is the U of U program takes the perspective of the application of biostatistical and health systems research methodology as they pertain to the health care system for the purpose of improving delivery of care to patient populations. The Population Health Science's Ph.D. program will focus on graduating academic researchers with specific focus on populations related to health systems.

Collaborative Programs

Within the University of Utah, there are several programs that will have a collaborative relationship with the Department of Population Health Science and its Ph.D. students. A significant collaboration with the Huntsman Cancer Institute (the Division of Cancer Population Science is housed within the Huntsman Cancer Institute and constitutes the academic hub of HCI's Cancer Control and Population Sciences program) will provide students with the opportunity to develop expertise in cancer research. This collaboration will address the growing cost and prevalence of cancer-related treatments, which is one of the largest funded research areas in health care. It is estimated that one in two men and one in three women will get cancer in their lifetimes, creating a substantial need for specialized expertise in this area. This

unique partnership will allow students in all emphases to take advantage of the cutting edge research at Huntsman.

Across the University, there will be course sharing, appointment of adjunct professors, Ph.D. mentors for Population Health Sciences students, and collaborative research projects for students to participate in while matriculated.

In addition to the Huntsman Cancer Institute, potential partners for collaboration across the University of Utah include:

- Department of Family and Preventive Medicine
  - Division of Public Health
- Department of Internal Medicine
  - Division of Epidemiology
  - Division of Genetic Epidemiology
- Department of Biomedical Informatics
- College of Pharmacy
  - Department of Pharmacotherapy (and the Pharmacotherapy Outcomes Research Center)
- Department of Pediatrics
  - Intermountain Injury Control Research Center
- Center for Clinical and Translational Sciences
  - Masters in Clinical Investigation
- College of Social and Behavioral Sciences
  - Economics
  - Family and Consumer Studies
  - Political Science
  - Psychology
  - Public Administration
  - Sociology
- College of Engineering
  - Mechanical Engineering
- David Eccles School of Business
  - Master of Healthcare Administration
- College of Health
- College of Nursing
- College of Social Work
- Eccles Health Sciences Library
- College of Humanities
  - Department of Communications (Health Communication)
- College of Science
  - Department of Math
- School of Computing
  - Department of Computer Science

The Population Health Sciences Educational Committee convened in September, 2014 and met regularly to provide input to the new Ph.D. curriculum. This committee and its subcommittees included faculty from the Division of Public Health in the Department of Family and Preventative Medicine, the Division of

Epidemiology in the Department of Internal Medicine, the Departments of Biomedical Informatics, Pediatrics, Internal Medicine, and Pharmacotherapy, as well as the Master of Statistics and Master of Science in Clinical Investigation programs. Intermountain Health Care and the Veterans Administration were also represented on the Education Committee. Finally, there were several meetings with leaders and faculty members of divisions with areas of similar academic and research interests as this new program, specifically the Division of Public Health and the Division of Epidemiology, and input on the curriculum was also solicited from numerous additional faculty across the University. All aspects of the curriculum and proposal were shared for feedback and input throughout the development process from the key collaborative programs mentioned.

Collaboration with and Impact on Other USHE Institutions

This is a unique and targeted program that is not offered elsewhere by USHE institutions. There is a close relationship with the field of Public Health and a natural path between those programs to the academic mission of Population Health Sciences that is expected to resonate with students at other USHE Institutions. It is anticipated that the creation of this degree program will generate a foothold for healthcare transformation scholarship in the state of Utah and within the Intermountain Region.

Benefits

There is a pressing need for scholarship and research to improve healthcare in this country as well as other countries. By creating a core at the University of Utah for this type of research, and fostering an environment of innovation and cutting edge health systems and biostatistics methods research, the USHE has the potential to transform into a beacon of innovation and research in this field, which will contribute to attracting exemplary faculty and students. The University of Utah will find itself at the forefront of healthcare transformation study and research.

Consistency with Institutional Mission

The Ph.D. program in Population Health Sciences will serve as an academic hub from which to broaden knowledge and expertise, and it will significantly enhance the University of Utah Health Sciences' academic and clinical missions. It also addresses, in part, the University's commitment to the Utah Legislature to prepare students to meet the demands of a transforming healthcare system.

Section IV: Program and Student Assessment

Program Assessment

This program is not subject to accreditation from any agency. As a graduate program at the University of Utah, the program will be subject to review by the Graduate Council and the University's Academic Senate. In addition, the School of Medicine will evaluate the program the same way it currently evaluates programs in other departments within the College. This Ph.D. program will also be subject to review by its advisory board, which will be comprised of qualified persons from across the University of Utah, the Veterans Administration, Intermountain Healthcare, and other industry partners. Student and faculty feedback will be critical components of the program evaluation process. Students with provide feedback on courses mid-semester and at semester completion. Faculty will evaluate student performance and curriculum.

Expected Standards of Performance

Graduates of the Ph.D. program will have specific knowledge in the emphases within Population Health Sciences, specifically Biostatistics and Health Systems Research. These graduates will become researchers, teachers, thinkers, and planners in academia, government, and industry. The graduates will

have the skills required to lead in universities, hospitals, insurance companies, and government where healthcare delivery, biostatistics, and healthcare transformation research in practiced and taught. Students will acquire these skills through completion of graduate requirements. These are:

1. Coursework: Students in the Ph.D. program will be expected to complete coursework in biostatistics, epidemiology, and research design to develop the tools to conduct independent scholarship in Population Sciences research.
2. Qualifying Examinations: During the spring semester of their second year, students will take a qualifying examination to assess their knowledge within their specific discipline and of the tools of research required in Population Health Sciences.
3. Dissertation: After successful completion of the Qualifying Examination and advancement to candidacy, students will develop a proposal for the dissertation, complete and defend the research.

Section V: Finance

Department Budget

Three-Year Budget Projection							
Departmental Data	Current Departmental Budget – Prior to New Program Implementation (Y1-Y3)	Departmental Budget					
		Year 1		Year 2		Year 3	
		Addition to Budget	Total Budget	Addition to Budget	Total Budget	Addition to Budget	Total Budget
Personnel Expense							
Salaries and Wages	7,431,293	111,000	2,515,249	127,810	2,604,186	140,644	2,691,312
Benefits	2,306,139	39,300	785,406	44,793	813,282	48,730	840,274
Total Personnel Expense	$9,737,432	$150,300	3,300,655	$172,603	3,417,468	$189,374	3,531,586
Non-Personnel Expense							
Travel*	36,000	6,000	18,000	6,500	18,500	7,000	19,000
Capital	0	0	0	0	0	0	0
Library	0	0	0	0	0	0	0
Current Expense/Other	529,000	11,812	194,812	2,112	175,112	2,112	175,112
Total Non-personnel Expense	565,000	14,812	208,812	5,612	190,612	5,612	191,112
Total Expense (Personnel + Current)	$10,302,432	$168,112	$3,513,467	$181,215	$3,611,080	$198,486	$3,725,698
Departmental Funding							

Appropriated Fund	5,201,801	142,912	1,729,124	151,215	1,947,441	164,886	2,009,450
Other: Clinical Dept./HCI	1,470,289	0	676,271	0	391,142	0	402,876
Special Legislative Appropriation	0	0	0	0	0	0	0
Grants and Contracts	3,630,341	0	1,108,072	0	1,242,497	0	1,279,772
Special Fees / Differential Tuition	0	25,200	25,200	30,000	30,000	33,600	33,600
Total Revenue	$10,302,432	$168,112	$3,513,467	$181,215	$3,611,080	$198,486	$3,725,698
Difference							
Revenue-Expense	$0	$0	$0	$0	$0	$0	$0
Departmental Instructional Cost / Student Credit Hour* (as reported in institutional Cost Study for "current" and using the same Cost Study Definition for "projected")	$	$1,000	$	$492	$	$335	$

**Travel funds for students, faculty, and staff*

Note: The "Current Departmental Budget-Prior to New Program Implementation" column is a current total for years 1-3. The "Addition to Budget" and "Total Budget" columns reflect the addition to the budget and total budget for each individual year as a result of the new program implementation. The increase in budget for all three years is $547,813, for a total budget of $10,850,245.

Funding Sources

The program will be funded through a combination of state funds, tuition differential (if approved), and institutional funds. Host departments of educational activities and programs within the University Health Sciences Center (HSC) receive educational funds (state, tuition, and other) through a formula developed and administered by the HSC Mission Based Management Office and the School of Medicine Executive Committee. The relevant funding formula for allocations associated with this Ph.D. program would be derived from student credit hours and from a Ph.D. student count. The applicable formula funds $252.18 per student for each credit hour generated by the department ($252.18 x number of credits taught x number of students), with an additional $21,579 per Ph.D. graduate (amounts referenced are for FY 2015; per unit values may fluctuate from year to year based on state allocation and educational activities).

Funding indicated under Grants and Contracts represents current and anticipated federal and foundation grants and contracts, industry contracts, and clinical trials relating to the mission of the department.

The program will be initially supported by state appropriated funds allocated by the HSC to allow for the development of the program and start-up operations. During Year 4 the HSC allocation will be amended to include Population Health Sciences so the department will then receive funding based on the Mission Based Management Office funding formula. During Year 8 the program will be sustainably funded by a combination of student differential tuition (if approved) and the applicable formula.

Reallocation

Funds are not being reallocated from other School of Medicine Departments to support this program.

Impact on Existing Budgets

State fund allocations for any current School of Medicine basic or clinical department will not be diminished based on the establishment of this graduate program.

Section VI: Program Curriculum

The curriculum for the Population Health Sciences Ph.D. is designed as a four-year program for students who enter the program with a master's degree in a field related to its Biostatistics or Health Systems Research emphases. Students who are admitted without a related graduate degree will be required to take an additional year of classes, labeled Year-0 in the tables below, to obtain the core background expertise required by the Ph.D. program.

All Program Courses (with New Courses in Bold)

Population Health Sciences Ph.D. Core Courses for All Emphases

Course Prefix and Number	Title	Credit Hours
Required Courses		
PHS 7000	Biostatistics for Clinical Research	3
PHS 7020	Analysis of Secondary Data	4
PHS 7030	Applied Modern Causal Inference	2
WRTG 7060 or WRTG 7080	Scientific Writing (WRTG 7060) or Scientific Writing (WRTG 7080)	3
PHS 7100	Foundations of Population and Clinical Health	3
PHS 7310	Comparative Health Systems Seminar I	2
PHS 7305	Research Compliance Training	1
	Total Number of Credits	18

Biostatistics Emphasis

Required Courses: Biostatistics Emphasis for students entering without a graduate degree in Statistics, Biostatistcs, Math, or other relevant graduate degree- Year 0

Course Prefix and Number	Title	Credit Hours
Required Courses		
MA 5080	Statistical Inference I	3
FPMD 6300 or MDCRC 6100 and 6110	Introduction to Epidemiology	3
FPMD 7120 or Math 6010	Linear and Logistic Regression (FPMD 7120) or Linear Models (Math 6010)	3
MA 5090	Statistical Inference II	3
FPMD 6107 or FPMD 7130	Survival Analysis (FPMD 6107) or Longitudinal Data Analysis (FPMD 7130)	3
STAT 6003	Statistical Programming	3
	Total Number of Credits	18

Population Health Sciences Ph.D.- Biostatistics Emphasis Years 1-4

Course Prefix and Number	Title	Credit Hours
Required Courses		
PHS 7000	Biostatistics for Clinical Research	3
PHS 7010	Analysis of Multilevel Data	3
PHS 7020	Analysis of Secondary Data	4
PHS 7030	Applied Modern Causal Inference	2
PHS 7035	Theory of Modern Causal Inference	2
FP MD6107 or FP MD 7130*	Survival Analysis or Longitudinal Data Analysis	3
WRTG 7060 or WRTG 7080	Scientific Writing (WRTG 7060) or Writing in the Health Sciences (WRTG 7080)I	3
PHS 7100	Foundations of Population and Clinical Health	3
PHS 7500	Special Topics Biostatistics	3
PHS 7310	Comparative Health Systems Seminar I	2
PHS 7305	Research Compliance Training	1
PHS 7900	Dissertation Work (minimum)	18
	Sub-Total	47
Elective Courses		
	Directed Elective from Departmental Approved List	3
	Directed Elective from Departmental Approved List	3
	Directed Elective from Departmental Approved List	3
	Directed Elective from Departmental Approved List	3

Course Prefix and Number	Title	Credit Hours
	Directed Elective from Departmental Approved List	3
	Sub-Total	15
	Minimum Number of Credits with previous MS	62
	Minimum Number of Credits without previous MS	80

* Qualified students may substitute one of the classes from the mathematical statistics directed electives. These classes include MA 5075, MA 6020, MA 6070.

Health Systems Research Emphasis

Required Courses: Health Systems Research Emphasis for students entering without a graduate degree in Statistics, Biostatistcs, Math, Economics, or other relevant graduate degree- Year 0

Course Prefix and Number	Title	Credit Hours
Required Courses		
FPMD 6300 or MDCRC 6100 and 6110	Introduction to Epidemiology	3
FPMD 7300	Epidemiology II	3
PHS 6000	Advanced Quantitative Methods I	3
PHS 6010	Advanced Quantitative Methods II	3
MDCRC 6230	Health Services Research	3
	Sub-Total	15
	Directed Elective (Optional)	3
	Total Number of Credits	18

Population Health Sciences Ph.D.- Health Systems Research Emphasis Years 1-4

Course Prefix and Number	Title	Credit Hours
Required Courses		
PHS 7000	Biostatistics for Clinical Research	3
PHS 7200	Health Systems Research Methods	3
PHS 7020	Analysis of Secondary Data	4
PHS 7030	Applied Modern Causal Inference	2
PHS 7310	Comparative Health Systems Seminar I	2
PHS 7320	Comparative Health Systems Seminar Domestic	1
PHS 7330	Comparative Health Systems Seminar International	1
PHS 7315	Comparative Health Systems Survey I	1
PHS 7325	Comparative Health Systems Survey Domestic	1
PHS 7335	Comparative Health Systems Survey International	2

Course Prefix and Number	Title	Credit Hours
WRTG 7060 or WRTG 7080	Scientific Writing (WRTG 7060) or Writing for the Health Sciences (WRTG 7080)	3
PHS 7100	Foundations of Population and Clinical Health	3
PADMN 6190 or FPMD 7140	Health Policy	3
ECON 6190 or ECON 7320	Health Economics	3
MDCRC 6120	Cost Effectiveness Analysis	1
FPMD 6600	Social Context of Medicine and Public Health	3
MDCRC 6260	Health Measurement and Survey Methods	2
PHS 7305	Compliance Training	1
MDCRC 6450	Grant Writing	2.5
PHS 7900	Dissertation (minimum)	18
	Sub-Total	59.5
Elective Courses		
	Directed Elective	3
	Sub-Total	3
	Minimum Number of Credits with previous MS (including Dissertation)	62.5
	Minimum Number of Credits without previous MS	80.5

The Population Health Sciences Curriculum Committee and external advisory board will continue to add appropriate directed electives to the approved list.

To avoid duplicating classes already taught at the university, this degree program will borrow heavily from the existing course catalog through required courses and directed electives.

Population Health Sciences will initially have two emphases in its Ph.D. program. Additional emphases are being considered, including an emphasis in Epidemiology. Epidemiology and any other future emphases will go through the governance process and separately seek approval from faculty, the Graduate Council, the Academic Senate, and the Board of Regents.

Program Schedule

Suggested Program Schedule: Biostatistics Emphasis for students entering without a graduate degree in Statistics, Biostatistcs, Math, or other relevant graduate degree- Year 0

Course Prefix and Number	Title	Credit Hours
Required Courses		
Fall Semester Year 0		
MA 5080	Statistical Inference I	3
STAT 6003	Statistical Programming	3
FPMD 7120 or Math 6010	Linear and Logistic Regression (FPMD 7120) or Linear Models (Math 6010)	3
Spring Semester Year 0		
MA 5090	Statistical Inference II	3
FPMD 6107 or FPMD 7130	Survival Analysis (FPMD 6107) or Longitudinal Data Analysis (FPMD 7130)	3

Course Prefix and Number	Title	Credit Hours
FPMD 6300 or MDCRC 6100 and 6110	Introduction to Epidemiology	3
	Total Number of Credits	18

Suggested Program Schedule: Biostatistics Emphasis for students entering with a graduate degree in Statistics, Biostatistcs, Math, or other relevant graduate degree- Years 1-4

Course Prefix and Number	Title	Credit Hours
Required Courses		
Fall Semester Year 1		
PHS 7000	Biostatistics for Clinical Research	3
PHS 7100	Foundations of Population and Clinical Health	3
FPMD 6107 or FPMD 7130	Survival Analysis or Longitudinal Analysis (If not previously taken)	3
PHS 7305	Research Compliance Training	1
	Total Number of Credits	10
Spring Semester Year 1		
PHS 7020	Analysis of Secondary Data	4
PHS 7010	Analysis of Multilevel Data	3
PHS 7310	Comparative Health Systems Seminar I	2
	Total Number of Credits	9
Fall Semester Year 2		
PHS 7030	Applied Modern Causal Inference	2
PHS 7035	Theory of Modern Causal Inference	2
	Directed Elective	3
	Directed Elective	3
	Total Number of Credits	10
Spring Semester Year 2		
WRTG 7060 or WRTG 7080	Scientific Writing (WRTG 7060) or Writing in the Health Sciences (WRTG 7080)	3
	Directed Elective	3
	Directed Elective	3
	Comprehensive Exams	
	Total Number of Credits	9
Fall Semester Year 3		
PHS 7500	Special Topics in Biostatistics	3
PHS 7900	Dissertation Work	6
	Total Number of Credits	9
Spring Semester Year 3		
PHS 7900	Dissertation Work	9
	Total Number of Credits	9
Fall Semester Year 4		

Course Prefix and Number	Title	Credit Hours
PHS 7900	Dissertation Work	9
	Total Number of Credits	9
Spring Semester Year 4		
PHS 7900	Dissertation Work	9
	Total Number of Credits	9

Suggested Program Schedule: Health Systems Research Emphasis for students entering without a Master's degree in Statistics, Biostatistcs, Math, or other relevant graduate degree- Year 0

Course Prefix and Number	Title	Credit Hours
Fall Semester Year 0		
FPMD 6300 or MDCRC 6100 and 61111	Introduction to Epidemiology	3
	Directed Elective (Optional)	3
	Advanced Quantitative Methods I	3
Spring Semester Year 0		
FPMD 7300	Epidemiology II	
	Advanced Quantitative Methods II	3
MDCRC 6230	Health Services Research	3
	Sub-Total	15
	Directed Elective (Optional)	3
	Total Number of Credits	18

Suggested Program Schedule: Health Systems Research Emphasis for students entering with a graduate degree in Statistics, Biostatistcs, Math, or other relevant graduate degree- Years 1-4

Course Prefix and Number	Title	Credit Hours
Required Courses		
Fall Semester Year 1		
PHS 7000	Biostatistics for Clinical Research	3
PHS 7100	Foundations of Population and Clinical Health	3
FPMD 6400	Social Context of Medicine & Public Health	3
PHS 7305	Research Compliance Training	1
	Total Number of Credits	10
Spring Semester Year 1		
PHS 7300	Health Systems Research Methods	3
PHS 7020	Analysis of Secondary Data	4
MDCRC 6220	Health Measurement and Survey Methods	2
PHS 7310	Comparative Health Systems Seminar I	2
	Total Number of Credits	11
Summer Year 1		

Course Prefix and Number	Title	Credit Hours
PHS 7315	Comparative Health Systems Survey I	1
	Total Number of Credits	1
Fall Semester Year 2		
MDCRC 6120	Cost Effectiveness Analysis	1
PHS 7030	Applied Modern Causal Inference	2
ECON 6190 or ECON 7320	Health Economics	3
	Directed Elective	3
	Total Number of Credits	9
Spring Semester Year 2		
WRTG 7060 or WRTG 7080	Scientific Writing (WRTG 7060) or Writing in the Health Sciences (WRTG 7080)	3
PADMN 6190 or FP MD 7410	Health Policy	3
	Directed Elective	2
PHS 7320	Comparative Health System Seminar Domestic	1
PHS 7325	Comparative Health System Survey Domestic	1
	Comprehensive Exams	
	Total Number of Credits	10
Fall Semester Year 3		
MDCRC 6450	Grant Writing	2.5
	Directed Elective	3
PHS 7900	Dissertation Work	4
	Total Number of Credits	9.5
Spring Semester Year 3		
PHS 7330	Comparative Health Systems Seminar International	2
PHS 7900	Dissertation Work	7
	Total Number of Credits	9
Summer Year 3		
PHS 7335	Comparative Health Systems Survey International	2
	Total Number of Credits	2
Fall Semester Year 4		
PHS 7900	Dissertation Work	9
	Total Number of Credits	9
Spring Semester Year 4		
PHS 7900	Dissertation Work	9
	Total Number of Credits	9

Note: There is a difference between the credit hour minimums shown in the program requirements and the credit hours shown in the sample schedules. There are two reasons for this. First, the institution anticipates students will come from a broad background of education and professional experience and has described a schedule with flexibility to allow students to take

additional courses and maintain full-time coursework based on deficiencies in core knowledge coming into the program. Second, there are Ph.D. students who will take additional courses or electives in order to gain extra knowledge or additional extra information in order to complete the dissertation.

Section VII: Faculty

Department of Population Health Sciences

Department Chair (To Be Named)
Full Time Faculty
Full Time Faculty
Full Time Faculty
Full Time Faculty

Biostatistics

Dr. Tom Greene Ph.D., M.S., Interim Chair, Department of Population Health Sciences; Proposed Division Chief
Full Time Faculty
Full Time Faculty

Health System Innovation and Research

Dr. Rachel Hess, M.D., M.S., Proposed Division Chief
Full Time Faculty
Full Time Faculty
Full Time Faculty

Cancer Population Sciences

Dr. Cornelia Ulrich, Ph.D., M.S., Proposed Division Chief
Full Time Faculty
Full Time Faculty
Full Time Faculty