



UNIVERSITY OF KENTUCKY

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COLLEGE OF PUBLIC HEALTH

MEMORANDUM

TO: Health Care Colleges Council

**FROM: Linda A. Alexander, EdD
Associate Dean for Academic Affairs**

SUBJECT: New Program Proposal – PhD in Epidemiology and Biostatistics

DATE: July 18, 2008

It is the intention of the College of Public Health to begin offering a new degree program – a PhD in Epidemiology and Biostatistics.

In November 2006, our college applied to the Kentucky Council for Post-Secondary Education for permission to develop a proposal for this new degree. The CPE posed several questions of us, which we answered, and on December 19, 2006, Provost Subbaswamy received notification that the CPE granted permission for us to develop the program.

This degree is an integrative doctoral program that will equip future researchers with substantial methodological and quantitative skills in the the disciplines of epidemiology and biostatistics, as well as advanced research-oriented training in both theory and methodology. Practicing MDs, DMD, PharmDs, and other health professionals who are interested in conducting population-based research and clinical trials will be the targeted audience for the degree; Master's-level graduates in the areas of psychology, computer science, engineering, business, biology, or chemistry may also find the degree program attractive.

After the full proposal was completed, it was reviewed and approved by the Academic Affairs Committee and the Faculty Council, according to our college's established bylaws.

Further information about this course can be obtained by contacting Dr. Richard Kryscio at 257-4064 or via email at kryscio@uky.edu.

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Nikou, Roshan

From: Graduate.Council.Web.Site@www.uky.edu
Sent: Thursday, November 13, 2008 6:05 AM
To: Nikou, Roshan
Cc: Price, Cleo
Subject: Investigator Report

AnyForm User: www.uky.edu
AnyForm Document: <http://www.research.uky.edu/gc/GCInvestigatorReport.html>
AnyForm Server: www.uky.edu (/www/htdocs/AnyFormTurbo/AnyForm.php)
Client Address: 74.140.171.78

College/Department/Unit: = PhD in Epidemiology and Biostatistics

Category:_ = New

Date_for_Council_Review: = November 13, 2008

Recommendation_is:_ = Approve

Investigator: = Brett Spear

E-mail_Address = bspear@uky.edu

1__Modifications: = Change CIP code to 26.9999 as per recommendation from Dr. Kert Viele to more accurately reflect the emphasis of content in the Epidemiology and Biostatistics in the College of Public Health. Dr. Viele will be able to better explain the need for this change.

2__Considerations: = Overall, this appears to be a solid program that serves a need. It is felt that there will be a sufficient number of students to keep this program going, and that there will be a variety of job opportunities in the areas of academia, industry, and health services for students having this degree. This program also utilizes the strengths of three departments - Epidemiology (College of Public Health), Biostatistics (College of Public Health) and Statistics (College of Arts and Sciences). The schedule of classes and courses (core courses and electives) seems to be reasonable.

3__Contacts: = Spoke at length with Dr. Kryscio. Several questions that were discussed at length are below.

1. This curriculum involves a number of new courses. Will this result in an excessive burden on faculty? Dr. Kryscio felt that this was not a concern. Several new faculty have been hired recently, and participating faculty are from three departments.

2. Are all three departments have a good working relationship, and are committed to make this program successful? Dr. Kryscio felt that the departments have learned to work together in past initiatives and should continue to do so here.

3. Is there a need for graduates with training in Epidemiology and Biostatistics? Dr. Kryscio stated that there are numerous studies indicating that there is a very strong need for those with this training, and that this need is likely to increase in the future.

Another concern I had was whether this program places a strong emphasis on research. A review of the goals, curriculum, and participating faculty indicates that this will be the case.

4__Additional_Information: = This new program includes a number of new programs. Descriptions of these programs are included with this program proposal. However, proposals for these courses have not been submitted to the Graduate School. I would recommend approval of this program contingent upon review and approval of all new courses.

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AnyFormRandomSeqNo: 53190534

LaRoche, Adrea S.

From: Brothers, Sheila C
Sent: Monday, September 22, 2008 8:42 AM
To: LaRoche, Adrea S.
Subject: FW: HCCC Transmittal - Program Change: MS in Athletic Training
Attachments: PhD Epi Bio Final Signatures.pdf; FW: important--EPI 714; FW: regarding the New Program Proposal for the PhD in Epidemiology and Biostatistics

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: Curricular Items

Don't let the subject line fool you – this is for a PhD in Epidemiology. ☺

Sheila

*Office of the Senate Council
Phone. (859) 257-5872*

From: Lindsay, Jim D.
Sent: Friday, September 19, 2008 2:20 PM
To: Nikou, Roshan; Jackson, Brian A
Cc: Brothers, Sheila C; Anderson, Heidi Milia; Flanagan, Rebecca; Alexander, Linda A; Kryscio, Richard
Subject: RE: HCCC Transmittal - Program Change: MS in Athletic Training

September 19th, 2008

TRANSMITTAL

TO: Brian Jackson, Roshan Nikou
Graduate Council
FROM: Jim Lindsay
Health Care Colleges Council

At its August 19th 2008 meeting, the Health Care Colleges Council approved the following proposal and is now forwarding it to the Graduate Council to approve:

College of Public Health
New Program: Ph.D. in Epidemiology

Attached are the materials to implement the requested action.

cc: Linda Alexander
Becki Flanagan
Richard Kryscio
Shelia Brothers
Heidi Anderson

Jim Lindsay
Health Care Colleges Council Coordinator
Associate Provost for Faculty Affairs Office
University of Kentucky, 205 Frazee Hall
Lexington, KY 40506-0031 Ph. (859) 323.6638
www.uky.edu/Provost/AcademicCouncil/council.php

LaRoche, Adrea S.

From: Ribes, Julie
Sent: Tuesday, August 19, 2008 10:49 AM
To: Lindsay, Jim D.
Subject: FW: important--EPI 714

Jim,
Here is the response to the grading issue. This will need to be corrected in the syllabus before it moves forward. Thanks
Jul

From: Browning, Steven R
Sent: Tuesday, August 19, 2008 8:41 AM
To: Kryscio, Richard; Ribes, Julie
Subject: RE: important--EPI 714

Dick,

It was a mistake. The grading rubric should be as below. There is no F grade in the graduate program and an E should be assigned for grades below 70%. Since this course has never been taught, the syllabus is a draft and this error was not caught previously.

Grade	%	Points (3 credit)
A	90-100	810-900
B	80-89	720-809
C	70-79	630-719
E	60-69	≤629

Thank you for pointing this out. --- Steve

From: Kryscio, Richard
Sent: Monday, August 18, 2008 5:45 PM
To: Browning, Steven R
Subject: important

Steve:

Received this question just a few minutes ago: it concerns the new course EPI 714. Can you answer the question by early tomorrow since the HSCC Committee is reviewing the epi-bio doctoral program application tomorrow.

The question follows:

EPI 714 pg 5 of the syllabus (pg 98 of the overall proposal)

Total points that can be earned is 900

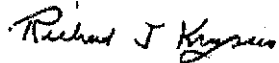
A is 900-1000 points

Does this mean that students are required to do mandatory extra credit to get an A? I saw nothing about that in re-reviewing the syllabus. Is this a mistake? Please clarify.

Send answer to Julie Ribes with a copy to me..

Many thanks (sorry for the short notice)

Dick



Richard J. Kryscio
Professor, Statistics
Chair, Biostatistics
Center on Aging
800 S. Limestone St.
University of Kentucky
Lexington, KY 40536
(859) 257-4064 x 295
(859) 257-4665 (fax)

Oral Exam before beginning their residency credits. Students must complete at least two semesters in the 2 credit hour residency course, for a minimum of 4 hours.

All students will be required to pass a written examination after the completion of three semesters of coursework and an oral exam before proceeding with the dissertation research. The dissertation research is expected to be an original scientific project which is integrative in the sense that either advanced biostatistical methods are applied to a population-based epidemiologic study of sufficient size and appropriate design or original theoretical research is undertaken in biostatistics with applied research problems. Faculty will encourage a dissertation document which shall produce at least two manuscripts which will be of publishable quality, as well as an integrative literature review of the area of research. The scope of the project shall demonstrate independence, mastery of research skills, thoughtful reflection of the results, and contribute to new knowledge in the field of investigation.

This program will require the formation of a doctoral committee. No fewer than 4 persons shall constitute the doctoral committee. A least 2 of the members must be full members of the graduate school. At least 3 of the 4 members must be faculty from the Departments of Epidemiology and Biostatistics (minimum of 1 from each department) in the College of Public Health. It is expected that the committee will meet on a regular basis to track student progress.

all new courses accounted for

Pre-requisites

- Bachelor's Degree
- Calculus: Univariate Differential and Integral Calculus (may be fulfilled by MA 113, MA 114)
- One course in Life Sciences
- STA 580: Biostatistics 1

Applications for admission to the PhD program will be reviewed by the admissions committee. This committee will include the program's DGS and representatives from the Biostatistics and Epidemiology Departments in the College of Public Health. All admitted students must satisfy all the requirements of the Graduate School.

BST 701 = elective BST 705 BST 704 BST 706 EPI 716 CPH 767 CPH 767 CPH seminar 786

Core Curriculum (39 hours)

- ✓ BST 675 Biometrics I
- ✓ BST 676 Biometrics II
- ✓ BST 639 Computing Tools
- ✓ BST 760 Advanced Regression
- ✓ BST 761 Time to Event Analysis
- ✓ BST 762 Longitudinal Data Analysis
- CPH 701 Current Issues in Public Health
- CPH 605 Intro Epidemiology
- CPH 712 Adv. Epidemiology
- ✓ EPI 714 Epidemiologic Study Design
- CPH 711 Chronic Disease Epidemiology
- ✓ EPI 715 Research Methods in Epi & Bio
- EPI 711 Chronic Disease Epidemiology

Seminars (4 hours)

Students must take 4 semesters of 1 credit hour seminar in the first 3 years (CPH 786).

Electives (15 hours)

5 courses- At least 2 epidemiology courses and 2 700-level Biostatistics courses. Must be approved by the student's dissertation committee.

Residency (4+ hours)

CPH 767 (2 credit hour course) will be taken each semester until they have completed and defended the dissertation. This course must be taken a minimum of two semesters.

Dissertation Research Defense

Students will present their dissertation research defense, presumably at the end of year four.

62 credit hours + Dissertation Research Defense

Typical Schedule of Classes for Full Time Student

Fall	Spring
Year 1	
CPH 605 Intro Epidemiology	CPH 712 Adv. Epidemiology
BST 675 Biometrics I	BST 676 Biometrics II
BST 639 Computing Tools	BST 760 Advanced Regression
Year 2	
EPI 714 Epidemiologic Study Design	EPI 715 Research Methods in Epi & Bio
BST 761 Time to Event Analysis	BST 762 Longitudinal Data Analysis
EPI 716 Infectious Disease Epidemiology	CPH 711 Chronic Disease Epidemiology
CPH 701 Current Issues in Public Health	
CPH 786 Seminar : 4 semesters of 1 credit hour seminar must be taken in the first 3 years	
Comprehensive Exam (between Fall and Spring of year 2)	
Qualifying Oral Exam (before residency credits)	
Dissertation Research Defense after year 4	
Year 3	
Elective	Elective
Elective	Elective
Elective	
Year 4	
CPH 767 Residency Credit	CPH 767 Residency Credit
	Dissertation Research Defense



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COLLEGE OF PUBLIC HEALTH

MEMORANDUM

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**FROM: Linda A. Alexander, EdD
Associate Dean for Academic Affairs**

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This degree is an integrative doctoral program that will equip future researchers with substantial methodological and quantitative skills in the the disciplines of epidemiology and biostatistics, as well as advanced research-oriented training in both theory and methodology. Practicing MDs, DMD, PharmDs, and other health professionals who are interested in conducting population-based research and clinical trials will be the targeted audience for the degree; Master's-level graduates in the areas of psychology, computer science, engineering, business, biology, or chemistry may also find the degree program attractive.

After the full proposal was completed, it was reviewed and approved by the Academic Affairs Committee and the Faculty Council, according to our college's established bylaws.

Further information about this course can be obtained by contacting Dr. Richard Kryscio at 257-4064 or via email at kryscio@uky.edu.

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UNIVERSITY SENATE REVIEW AND CONSULTATION SUMMARY SHEET

Proposal Title: PhD in Epidemiology and Biostatistics

Proposal Contact: Dr. Richard Kryscio, Chair, Department of Biostatistics
 College of Public Health
 121 Washington Avenue, Room 200
 CAMPUS 0003
 Phone: 257-4064
 Email: kryscio@uky.edu

Becki Flanagan, Academic Affairs
218-2092 becki@uky.edu

Instruction: To facilitate the processing of this proposal please identify the groups or individuals reviewing the proposal, identify a contact person for each entry, provide the consequences of the review (specifically, approval, rejection, no decision and vote outcome, if any) and please attach a copy of any report or memorandum developed with comments on this proposal.

Reviewed By	Contact person	Consequences of Review	Date of Proposal Review	Review Summary Attached?
Council on Post-Secondary Education	James Applegate	Approved	12/19/2006	Yes
Academic Affairs Committee	Marta Mendiondo, Chair	Approved	6/17/08	Yes
Faculty Council	Glyn Caldwell, Chair	Approved	6/26/08	Yes
Office of Academic Affairs	Linda Alexander, Associate Dean	Approved	7/18/08	Yes



UNIVERSITY OF KENTUCKY

College of Public Health
Department of Biostatistics
121 Washington Ave., Suite 201
Lexington, KY 40536-0003
(859) 257-5678 Ext. 82097
Fax: (859) 257-6430
<http://www.mc.uky.edu/PublicHealth>

Members of HCCC,

The attached paperwork includes all supporting documents for a new program "PhD in Biostatistics and Epidemiology" that is being submitted to your committee for review. This program has been approved by the Department of Biostatistics, Department of Epidemiology, Academic Affairs Committee, and Faculty Council within the College of Public Health.


Collectively the Departments of Biostatistics and Epidemiology have thirteen faculty members in the regular title series and eight adjunct faculty members who are excited about the prospect of this new degree and the opportunity it presents to teach advanced graduate level courses that complement their individual research programs.

This degree will train students to work on the interface between epidemiology and biostatistics. With the increased availability of large health related data warehouses, challenging methodological and epidemiological problems arise. In order for universities to reach out into the community by transferring research findings that will affect the health of the population in a meaningful way, innovative research design and epidemiological issues must be addressed. To our knowledge, this is the first formal combined doctoral program offering core training in both biostatistics and epidemiology in the country. The field of biostatistics has grown to the point that a new graduate program will have difficulty covering all relevant material; this program chooses to focus its biostatistics content on population based research emphasizing the issues practicing epidemiologists face. This program will put our graduates in a competitive position to address these timely and important issues.

The creation of this degree is aligned with the goals of our University to move into the top 20 research universities. The proposed program does not compete with any other doctoral program on campus and, in fact, complements other graduate programs. Enclosed please find a letter of support from the Chair of the Department of Statistics, College of Arts and Sciences. Four of the biostatistics faculty involved in this new program have joint appointments in the Statistics Department. Finally, the proposed program is also aligned with the mission of the new Center for Clinical and Translational Sciences that is emphasizing translation from the clinic into the community. This latter center is supported by the university administration as one of its priorities.

Please do not hesitate to contact us if there is any additional information that you need.

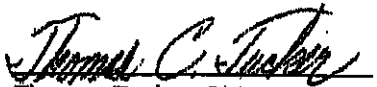
Sincerely,



Marta S. Mendiondo, PhD
Chair, PhD in Biostatistics and Epidemiology Committee, College of Public Health



Richard J. Kryscio, PhD
Chair, Department of Biostatistics



Thomas Tucker, PhD
Chair, Department of Epidemiology



Stephen W. Wyatt, DMD, MPH
Dean, College of Public Health



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Department of Biostatistics
121 Washington Ave., Suite 201
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Department of Statistics
College of Arts and Sciences

Statistics Department faculty members,

Several members of the Department of Biostatistics, College of Public Health have been closely involved with the development of the new track for the existing MS in Statistics and the creation of some of the new courses to be offered, some of which will be cross-listed. The final program proposal changes to the MS in Statistics have been presented and discussed at several CPH Biostatistics Department faculty meetings and it has the full support of the department and the College of Public Health.

Sincerely,

A handwritten signature in cursive script that reads 'Richard J. Kryscio'.

Richard J. Kryscio, PhD
Chair, Department of Biostatistics
College of Public Health

A handwritten signature in cursive script that reads 'Stephen W. Wyatt'.

Stephen W. Wyatt, DMD, MPH
Dean, College of Public Health



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DEPARTMENT OF STATISTICS

July 17, 2008

The Department of Statistics in the College of Arts and Sciences has been directly involved with the development of a joint doctoral program in Epidemiology and Biostatistics. After reviewing the Ph.D. in Epidemiology and Biostatistics new program proposal from the College of Public Health at several faculty meetings, the Department of Statistics in the College of Arts and Sciences fully supports its creation and we look forward to collaborating on the proposed cross-listed courses as well as new courses that may be developed in the future.

Sincerely,

A handwritten signature in black ink, appearing to read 'Arnold J. Stromberg'.

Arnold J. Stromberg, Ph.D.

Chair, Department of Statistics

College of Arts and Sciences

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**KENTUCKY COUNCIL ON
POSTSECONDARY EDUCATION**

Ernie Fletcher
Governor

1024 Capital Center Drive, Suite 320
Frankfort, Kentucky 40601
Phone (502) 573-1555
Fax (502) 573-1535
<http://cpe.ky.gov>

Thomas D. Layzell
President

December 19, 2006

Kumble Subbaswamy
Provost
University of Kentucky
106 Gillis Building
Lexington, Kentucky 40506-0033

Dear Swamy,

The 45-day review period for the proposed Ph.D. in Epidemiology and Biostatistics has ended. Although programs in CIP 26 Biological Sciences/Life Sciences are inside UK's program band, this program is closely connected with the Statewide Public Health Strategy adopted by the Council in 2004. Because of the strategic importance of the Statewide Public Health Strategy, the Council is requesting that you submit a full proposal for this program.

In that full proposal, please make sure that you address the issues posted by the Council staff on December 13th:

- 1. The only other Ph.D. programs in these areas are at UofL. Although the enrollments are up somewhat in these programs from 2001-2005, degree production is down. In biostatistics, degree production in the masters program at UofL is down from 6 to 1 over three years. Only one doctoral degree was granted (in 2004-05) during this three-year period. Has UK discussed these degree production numbers with UofL? Why would higher degree production numbers be expected at UK?*
- 2. How is this program different from the separate programs in biostatistics and epidemiology at UofL?*
- 3. Given the low numbers of students currently involved in these areas at the doctoral level, has UK considered developing joint degrees with UofL?*
- 4. Under an earlier Council policy related to public health programs, UofL was to offer research degrees and UK the practitioner degrees (DrPH). In 2004 the Council approved the Statewide Public Health Strategy which redefined the approach to public health in Kentucky.*

Kumble Subbaswamy
December 19, 2006
Page Two

How do these programs align with the strategy? What are UK's plans and timeline for implementing its part in the overall strategy of which these programs may be a part?

5. The January implementation date is not possible as this program will need to go before the Council for approval given its link to the Council- approved statewide strategy. The Council will want to consider these programs in light of general progress on the statewide strategy.

6. Given the combination of emphases in this program, there does not appear to be an appropriate CIP code for the program. It fits neither the CIP for Epidemiology or Biostatistics. This will require further discussion.

If you have any questions, please contact Melissa Bell at Melissa.Bell@ky.gov or 502-573-1555 ext. 357.

Sincerely,



James L. Applegate
Vice President of Academic Affairs

Response to Comments from CPE PhD in Epidemiology and Biostatistics

1. *The only other PhD programs in these areas are at UofL. Although the enrollments are up somewhat in these programs from 2001-2005, degree production is down. In biostatistics, degree production in the masters program at UofL is down from 6 to 1 over three years. Only one doctoral degree was granted (in 2004-05) during this three-year period. Has UK discussed these degree production numbers with UofL? Why would higher degree production numbers be expected at UK?*

Degree production numbers at the University of Kentucky are expected to be higher because we have a strong feeder program in terms of our students enrolled in the Master of Public Health degree program, especially in the concentrations of epidemiology and biostatistics. Moreover, the number of students in the dual-concentration MPH (epidemiology/biostatistics) has steadily increased. This prompted us to examine and change the degree requirements to accommodate the growing increase of interest in the dual concentration. With the advent of our full accreditation by the Council on Education for Public Health (CEPH) in June 2005 and our selection as a pilot school for the launch of SOPHAS (spell out) in Fall 2006, we expect continued strong interest in both our MPH and DrPH programs.

We have had students express an interest in the combined PhD program, and some students have sought the degree elsewhere because it was not available here.

The development of this specific doctoral program has been discussed with both the University of Louisville (Dr. Rick Clover) and CPE (Dr. Jim Applegate); both offered their support for the University of Kentucky to move forward and initiating the process for approval. A discussion specifically about degree production numbers has not been initiated to date with the University of Louisville because of the interest expressed by our students specifically regarding a combined program.

2. *How is this program different from the separate programs in biostatistics and epidemiology at UofL?*

The University of Louisville program is a combined program in Biostatistics and Decision Science. Our proposed PhD program is also a multidisciplinary degree program designed to provide the student with the skills to conduct applied research in the combined disciplines of epidemiology and biostatistics. Our faculty feel strongly that a graduate from a combined program is better prepared to confront emerging public health issues that increasingly require multidisciplinary solutions.

3. *Given the low numbers of students currently involved in these areas at the doctoral level, has UK considered developing joint degrees with UofL?*

We have not considered developing a joint PhD program with the University of Louisville because we have not experienced low enrollment numbers as mentioned in the comments posted, and our interest at this time is in a combined program rather than in separate programs.

- 4. Under an earlier Council policy related to public health programs, UofL was to offer research degrees and UK the practitioner degrees (DrPH). In 2004 the Council approved the statewide public health strategy which redefined the approach to public health in Kentucky. How do these programs align with the strategy? What are UK's plans and timeline for implementing its part in the overall strategy of which these programs may be a part?*

Continued CEPH accreditation requires that we offer three additional PhD programs, other than our PhD in Gerontology. In the Spring of 2006, we raised this issue with the State-Wide Strategy For Public Health Education And Research and, as noted in our response to question #1, received the support of Dr. Jim Applegate and the University of Louisville for us to offer PhD programs.

- 5. The January implementation date is not possible as this program will need to go before the Council for approval given its link to the Council-approved statewide strategy. The Council will want to consider these programs in light of general progress on the statewide strategy.*

With approval of the program by CPE, we will begin to follow the University of Kentucky and CPE guidelines for the development and approval of new programs in January 2007. We anticipate recruiting students into the program no earlier than January 2008.

- 6. Given the combination of emphases in this program, there does not appear to be an appropriate CIP code for the program. It fits neither the CIP for Epidemiology or Biostatistics. This will require further discussion.*

Just as the University of Louisville combined PhD in Biostatistics and Decision Science is likely catalogued under the CIP code for a biostatistics doctorate, we are following a similar strategy. Since a CIP Code for a combined program does not currently exist, it has been agreed upon between our Epidemiology and Biostatistics Departments that the CIP Code for Biostatistics be utilized for this program. One way to view this program is that it is a doctoral degree in biostatistics with an emphasis in epidemiology.

MEMORANDUM

To: Faculty Council

From: Marta S. Mendiondo 
Chair, Academic Affairs Committee

Date: June 17, 2008

The Academic Affairs committee approved the new program request for the PhD in Epidemiology and Biostatistics, which includes several new course proposals and course changes.

TO: Linda Alexander
Associate Dean for Academic Affairs

CC: Marta Mendiolo
Chair, Academic Affairs Committee

CC: Richard Kryscio
Thomas Tucker

FROM: Glyn G. Caldwell
Chair, Faculty Council

DATE: June 26, 2008

SUBJECT: Approval of the joint Doctor of Philosophy Degree in Biostatistics
and Epidemiology

On June 26, 2008, the Faculty Council of the College of Public Health
unanimously approved the joint Doctor of Philosophy Degree in Biostatistics and
Epidemiology.


New Program Request

REQUEST FOR A NEW PROGRAM

Degree title: PhD in Epidemiology and Biostatistics

Major title: Epidemiology and Biostatistics Option: N/A Major code in SIS:

Primary College: College of Public Health

**CIP Code: ~~26.1102 Biostatistics~~ 
~~26.1309 Epidemiology~~**

Accrediting Agency: N/A

Contacts:

Marta S. Mendiondo	marta@email.uky.edu	257-1412 x274
Richard J. Kryscio	kryscio@uky.edu	257-4064
Thomas C. Tucker	tct@kcr.uky.edu	219-0773 x225

I. Abstract

The proposed PhD program in epidemiology and biostatistics is intended to prepare professionals for a career in conducting population-based research and clinical trials. It is a unique program which strongly emphasizes the acquisition of applied skills in the complementary fields of epidemiology and biostatistics, as well as the theoretical foundations of these disciplines. Graduates of this program will be prepared to address the practical challenges of conducting population-based and clinical, translational research in the multidisciplinary work environments of academia, government, and industry. Unlike traditional doctoral preparation in either discipline alone, this program will leverage the unique collaborative environment between the departments of Biostatistics and Epidemiology in the College of Public Health. The essentially strong cross-training and mentoring nature of the program is intended to develop independent researchers who will be skilled in designing and conducting studies as well as analyzing, and interpreting the results from increasing variety of designs and databases in the public health and medical research domains.

This is intended to be an integrative doctoral program which prepares future researchers who will have substantial methodological and quantitative preparation in the unique domains of these two disciplines. This program is intended to provide advanced, research-oriented training in both theory and methodology. Scholars will be required to undertake a doctoral dissertation, following the completion of required course work and examinations, which will be of the caliber for publication as independent research in respected biostatistical, epidemiological, or statistics journals.

AUDIENCE

The target audience for this program will include students with an appropriate prior bachelor's or masters degree (in biostatistics, epidemiology, statistics, health services research, mathematical sciences, or a related field) with a prior mathematical training to include two semesters of calculus (univariate differential and integral which can be fulfilled by MA 113 and MA 114) and statistical methods (STA 580). Practicing health care professionals (MDs, DMDs, PharmDs, etc) who are interested in pursuing independent, doctoral level, research careers will be targeted for the program. Master's graduates from psychology, computer science, engineering, business, biology, or chemistry may also find this degree program attractive.

The program will prepare students for research oriented careers in population based studies and clinical research studies including clinical trials. There is a severe shortage of doctoral level graduates with training in epidemiology and biostatistics. This program is unique since it requires students to acquire proficiency in both areas. A terminal master's degree (MS) in epidemiology is embedded into the program.

NEED

There is an increasing need for research-oriented health professionals who will be qualified to conduct population-based research and clinical trials in the next several decades. The production of doctoral-prepared biostatisticians has remained steady while the demand has increased markedly with increasing opportunities in the biomedical research enterprise. At present, there is both a shortage of biostatisticians with some training in biology and disease process knowledge, as well as epidemiologists with an understanding of the new developments in the biostatistics, data management, and clinical trials research. There has been an intense demand for scientifically trained (subject matter) data analysts who can address the issues in conducting studies which include large amounts of complex data. The neurosciences, surveillance, and computational biology are expected to be growth areas which will demand the complex, integrated skill set of a new group of professionals.

Although the economy is slowing down, Smith Hanley reported that "Quantitative Professionals are secure . . . Recruiters at Smith Hanley have not seen signs of slowdowns in our markets . . . As many corporations are realizing the limitations of outsourcing their analytics overseas, they have turned to domestic consulting . . . This leads to a visible growing demand for quantitative professionals in consulting environments. ." (Burtch, Linda. *Recession Talk Exaggerated re Analytical Job Market. Smith Hanley Trends 2008.*)

II. Program Description

Competencies

The following competencies for the MS in Epidemiology are based on the core courses for the degree:

1. Understand the interface between biostatistics and epidemiology
2. Demonstrate advanced proficiency to apply concepts and methods from these disciplines jointly.
3. Demonstrate the ability to review and critically evaluate the literature in a substantive area of research, be able to identify gaps in knowledge and be able to formulate original research hypotheses or statements
4. Evaluate the strengths and limitations of epidemiologic reports.
5. Draw appropriate inferences from data.
6. Communicate research results orally and in writing to lay and professional audiences.
7. Demonstrate an understanding of concepts of probability and statistical inference as they apply to problems in public health.
8. Demonstrate proficiency in using computing tools commonly encountered in epidemiology and biostatistics.
9. Understand the principles of epidemiologic study design and be able to calculate the appropriate epidemiologic measures for most typical designs.
10. Become proficient at and be able to evaluate the strengths and limitations of advanced designs including multivariate linear models, generalized linear models, longitudinal models, mixed effects models, and survival models both parametric and nonparametric.
11. Understand the principles of chronic and infectious disease epidemiology.
12. Demonstrate an understanding of research methods used in epidemiology and biostatistics.
13. Demonstrate knowledge of the public health system in the commonwealth and the country.

Curriculum

Students will complete a minimum of 62 credit hours of study and a dissertation research. All requirements must be completed within the number of years determined by the graduate school (8 years at this time) of undertaking the program. The core curriculum consists of 39 hours comprising thirteen courses, including several courses in epidemiology and biostatistics, and a one-credit-hour course that will serve as a broad introduction to public health. Students will also complete a minimum of 15 credit hours of electives (including at least two epidemiology courses and two 700 level biostatistics courses), all of which must be approved by the student's dissertation committee and the DGS. In addition, the student must complete four one-hour seminars within the first three years and three semesters of dissertation credits (CPH 769). Students will be required to pass a Comprehensive Exam between the Fall and Spring semesters of their second year in the program. Also, students must pass a Qualifying

Oral Exam before beginning their residency credits. Students must complete at least two semesters in the 2 credit hour residency course, for a minimum of 4 hours.

All students will be required to pass a written examination after the completion of three semesters of coursework and an oral exam before proceeding with the dissertation research. The dissertation research is expected to be an original scientific project which is integrative in the sense that either advanced biostatistical methods are applied to a population-based epidemiologic study of sufficient size and appropriate design or original theoretical research is undertaken in biostatistics with applied research problems. Faculty will encourage a dissertation document which shall produce at least two manuscripts which will be of publishable quality, as well as an integrative literature review of the area of research. The scope of the project shall demonstrate independence, mastery of research skills, thoughtful reflection of the results, and contribute to new knowledge in the field of investigation.

This program will require the formation of a doctoral committee. No fewer than 4 persons shall constitute the doctoral committee. At least 2 of the members must be full members of the graduate school. At least 3 of the 4 members must be faculty from the Departments of Epidemiology and Biostatistics (minimum of 1 from each department) in the College of Public Health. It is expected that the committee will meet on a regular basis to track student progress.

Pre-requisites

Bachelor's Degree

Calculus: Univariate Differential and Integral Calculus (may be fulfilled by MA 113, MA 114)

One course in Life Sciences

STA 580: Biostatistics 1

Applications for admission to the PhD program will be reviewed by the admissions committee. This committee will include the program's DGS and representatives from the Biostatistics and Epidemiology Departments in the College of Public Health. All admitted students must satisfy all the requirements of the Graduate School.

Core Curriculum (39 hours)

BST 675 Biometrics I

BST 676 Biometrics II

BST 639 Computing Tools

BST 760 Advanced Regression

BST 761 Time to Event Analysis

BST 762 Longitudinal Data Analysis

CPH 701 Current Issues in Public Health

CPH 605 Intro Epidemiology

CPH 712 Adv. Epidemiology

EPI 714 Epidemiologic Study Design

CPH 711 Chronic Disease Epidemiology

EPI 715 Research Methods in Epi & Bio

EPI 711 Chronic Disease Epidemiology

Seminars (4 hours)

Students must take 4 semesters of 1 credit hour seminar in the first 3 years (CPH 786).

Electives (15 hours)

5 courses- At least 2 epidemiology courses and 2 700-level Biostatistics courses. Must be approved by the student's dissertation committee.

Residency (4+ hours)

CPH 767 (2 credit hour course) will be taken each semester until they have completed and defended the dissertation. This course must be taken a minimum of two semesters.

Dissertation Research Defense

Students will present their dissertation research defense, presumably at the end of year four.

62 credit hours + Dissertation Research Defense

Typical Schedule of Classes for Full Time Student

Fall	Spring
Year 1	
CPH 605 Intro Epidemiology	CPH 712 Adv. Epidemiology
BST 675 Biometrics I	BST 676 Biometrics II
BST 639 Computing Tools	BST 760 Advanced Regression
Year 2	
EPI 714 Epidemiologic Study Design	EPI 715 Research Methods in Epi & Bio
BST 761 Time to Event Analysis	BST 762 Longitudinal Data Analysis
EPI 716 Infectious Disease Epidemiology	CPH 711 Chronic Disease Epidemiology
CPH 701 Current Issues in Public Health	
CPH 786 Seminar : 4 semesters of 1 credit hour seminar must be taken in the first 3 years	
Comprehensive Exam (between Fall and Spring of year 2)	
Qualifying Oral Exam (before residency credits)	
Dissertation Research Defense after year 4	
Year 3	
Elective	Elective
Elective	Elective
Elective	
Year 4	
CPH 767 Residency Credit	CPH 767 Residency Credit
	Dissertation Research Defense

List of Core Courses

- BST 675** **Biometrics I (4)** This course, the first of a two-semester sequence in biometrics, introduces probability, discrete random variables, continuous random variables, and sampling distributions.
- BST 676** **Biometrics II (4)** This course, the second of a two-semester sequence in biometrics, introduces techniques for constructing and evaluating point estimators, hypothesis testing procedures, and interval estimators.
- CPH 605/
PM 720** **Epidemiology (3)** In this course students are taught the principles and methods of epidemiologic investigations, research methodology, and statistical integration. Major topics include etiologic factors of disease and injury, the distribution of health problems within populations, levels of prevention, and the concept of risk. The design of retrospective, cross-sectional and prospective studies are examined to illustrate odds ratio, relative risk, life tables, and person-years. Students are required to complete and submit a research proposal, present a topic paper, and serve as a co-facilitator for an article discussion.
- CPH 712** **Advanced Epidemiology (3)** Provides an in-depth understanding of the evidence needed to show causal relationships and epidemiologic theories, concepts and tools used to establish causal relationships.
- BST 639/
CPH 639** **Computing Tools (3)** Introduction to statistical and epidemiologic software technologies commonly used for the collection, management, and analysis of data. It is designed to prepare first year students for further coursework and dissertation research.
- BST 760** **Advanced Regression (3)** This course provides an introduction to theoretical methods and applications of linear and generalized linear models. Regression methods for normally distributed outcomes will provide a discussion of experimental design, design matrices, and modes of parametric inference for the linear model. Students will learn to apply these concepts in sophisticated data analysis where they will implement tools for model building and selection, variable selection, and handling categorical predictors, confounders and interactions. Additionally, students will learn polynomial regression and flexible alternatives such as weighted least squares and robust, ridge and nonparametric regression. Regression methods for non-normal outcomes (focusing on binomial and count data) will be covered in detail, providing students with foundational tools for understanding and implementing generalized linear models that are commonly used to analyze epidemiologic and public health data from various study designs including but not limited to cohort, case-control, and clinical trials.

- BST 761** Time to Event Analysis (3) Analysis of time to event data encountered in Public Health and Medicine. Survival distributions and hazard functions. Time to event analysis using Kaplan-Meier method and life-table method. Accelerated failure time model, logit model for discrete data, complementary log-log model, and proportional hazards model. Tests for goodness-of-fit, graphical methods, and residual and influence statistics. Time-dependent covariates, non-proportional hazards, left truncation, and late entry into the risk set. Sample size and power, competing risks, and time to event analysis with missing data.
- BST 762/
STA 632** Longitudinal Data Analysis (3) This course presents statistical techniques for analyzing longitudinal studies and repeated measures experiments that occur frequently in public health, clinical trials, and outcomes research. This course will cover linear mixed models, generalized linear mixed models and an introduction to nonlinear models as they apply to the analysis of correlated data.
- EPI 715** Research Methods in Epidemiology & Biostatistics (3) This course builds a broad array of skills that are useful for the design and development of research protocols and funding applications for peer review, and for the analysis of resultant scientific data.
- EPI 714** Epidemiologic Study Design (3) This course provides students with advanced course material relevant to the planning and execution of epidemiologic studies of various designs. The course will consider study designs which employ routinely collected data on disease occurrence, such as would be undertaken in government agencies and health departments, and the classic etiologic study designs including the case-control, prospective cohort, retrospective cohort, nested case control, case-cohort, and case-crossover designs. The course will focus considerable attention on measurement methods and measurement error, borrowing examples from the subfields of epidemiology including occupational, cardiovascular, and social epidemiology. Given current interest on multilevel methods of analysis, the class will discuss approaches to designing multilevel studies. Finally, we will consider recent advances in experimental epidemiology with consideration of controlled community trials.
- CPH 711** Chronic Disease Epidemiology (3) Provides students with an overview of the risk factors associated with the most common chronic diseases, data sources available about these diseases and epidemiologic theories, concepts and tools associated with these diseases.
- EPI 716** Infectious Disease Epidemiology (3) Emphasizes the epidemiological and microbiological methods used to study infectious diseases including new, emerging, and re-emerging diseases. Include are the history,

epidemiologic concepts and tools needed to understand and investigate the maintenance, transmission, and effects of infectious disease in human populations.

CPH 701 **Current Issues in Public Health (1)** This seminar course will introduce MS and PhD students to the critical role of public health in protecting, maintaining, and improving the health of the population. Specific emphasis will be directed to the "Ten Essential Functions of Public Health" through weekly lectures, readings, and writing assignments. All five core areas of public health will be introduced

List of Electives

CPH 631 **Design and Analysis of Health Surveys (3)** Design and analysis issues associated with well known national health surveys, including reliability and validity of measurements, instrument validation, sampling designs, weighting of responses, and multiple imputations. Students will learn how to use statistical software to analyze data from complex survey designs.

CPH 636 **Data Mining in Public Health (3)** This course concerns statistical techniques for and practical issues associated with the exploration of large public health data sets, the development of models from such data sets, and the effective communication of one's findings.

BST 740 **Spatial Statistics (3)** This course covers the following topics: risks and rates, types of spatial data, visualizing spatial data, analysis of spatial point patterns, spatial clustering of health events based on case control studies, and based on regional counts, linking spatial exposure data to health events through regression modeling, Bayesian spatial analysis.

**BST 763/
STA 665** **Analysis of Categorical Data (3)** Multinomial and product-multinomial models; large-sample theory of estimation and testing, Pearson chi-square and modified chi-square statistics, Pearson-Fisher Theorem, Wald Statistics and generalized least squares technique; applications to problems of symmetry, association and hypotheses of no interaction in multi-dimensional contingency tables.

**BST 713/
STA 653** **Clinical Trials (3)** Design and analysis of Phase I-III clinical trials, interim monitoring of trials, sample size, power, crossover trials, bioequivalency, mixed models, and meta analysis.

BST 764 **Applied Statistical Modeling for Medicine and Public Health (3)** This course introduces some useful statistical models not typically encountered in the core courses of a master's or doctoral biostatistics curriculum.

These include finite mixture models, nonparametric regression models, covariance-based models, and stochastic models.

- BST 765** **Missing Data Methodology for Public Health (3)** This course surveys methods for analyzing data with missing observations. This includes methods for data missing completely at random including hot deck cold deck, mean substitution, and single imputation; methods for data missing at random including multiple imputation and weighted estimating equations and methods for data missing not at random including pattern mixture models, selection models, and shared random effects models.
- BST 766** **Analysis of Temporal Data in Public Health (3)** This course surveys methods for analyzing public health data collected over time. Methods covered include smoothing time series data, the modeling of stationary time series for Gaussian, dichotomous, and case count responses, methods for detecting the clustering of disease over time, and methods for the surveillance of infectious diseases in real time.
- BST 701** **Bayesian Modeling in Biostatistics (3)** This course provides an introduction to Bayesian ideas and data analysis applied to the biosciences. The course illustrates current approaches to Bayesian modeling and computation in biostatistics.
- CPH 610** **Injury Epidemiology (3)** Describes the distribution and determinants for traumatic injury and poisonings, including both intentional and unintentional events. Topics include: sources of data, methodological approaches to studying injuries, evaluation of injury interventions, and the link between epidemiology and public health policy impacting injuries.
- CPH 614** **Managerial Epidemiology (3)** Reviews the fundamental principles of epidemiology and teaches students how to apply these principles to the management of health service organizations.
- CPH 616** **Cardiovascular Epidemiology (3)** Provides students with an overview of the risk factors associated with cardiovascular disease. Also teaches students about variations in the frequency of risk factors and in the rates of cardiovascular disease by characteristics of person, time and place.
- CPH 617** **Environmental and Occupational Epidemiology (3)** Provides students with an understanding of occupational and environmental exposures and their associations with specific health effects, and with the application of epidemiologic concepts and methods to describe and analyze these associations. Combines lectures on exposure assessment, study design and methodological issues, as well as discussion and presentation of topics focused on specific outcomes and exposures.

- CPH 662 Public Health Response to Terrorism & Disasters (3) Focuses on public health concepts, history, methods, planning and response preparedness in response to a Weapons of Mass Destruction (WMD) terrorist attack, in both the nation and Commonwealth of Kentucky. Will discuss how public health methods can be applied to response planning and preparedness for such a bioterroristic WMD attack and improve the public health and medical infrastructure for response to natural disasters. Public health response includes surveillance of disease and laboratory reports for evidence of WMD attack, as well as epidemiological review of suspicious cases of illness potentially related to biological or chemical weapons.
- CPH 718 Special Topics: Decision-Making in Health and Medicine (3) This course applies decision science theory to healthcare decision making. It is intended for epidemiologists, managers, and health behaviorists who want to understand the process of rational decision-making. Topics include (1) managing uncertainty, (2) treatment decisions, (3) valuing healthcare outcomes, (4) diagnostic test decisions, (5) prevention and screening, (6) tests with multiple outcomes, (7) cost-effectiveness, cost-benefit, and cost-utility analysis, and (8) modeling events that reoccur over time.
- CPH 718 Special Topics: Oral Health Epidemiology (3) This course describes the concepts and principles of oral health epidemiology. The purpose is to use epidemiology principles and concepts and apply them to oral health related questions. This is an advanced, 700 level course, and will be intense. Although basic and intermediate/ advanced principles of epidemiology, biostatistics and oral biology will be reviewed early in the course, students are expected to have good working knowledge of these subject areas. Students are not expected to have a background in dentistry, but their biology, math and critical thinking abilities are expected to be worthy of the level of this course. The course includes discussions of the theory and methods of epidemiology, biostatistics and biology, sociology and philosophy and their applications to oral health.
- CPH 718 Special Topics: Cancer Epidemiology (3) This course applies and integrates the principles and tools of epidemiology to the study of cancer. The course includes discussion of the burden of various kinds of cancer across the United States and the world by age, gender, and race/ethnicity, the underlying biology behind the development of cancer in humans, cancer surveillance, the epidemiology of various kinds of cancer by category of major risk factors such as human behavior (e.g. smoking and alcohol use), endogenous/exogenous hormones, viruses, environmental/ occupational, and diet, and sources of data and methods for evaluating cancer screening, measuring the impact of risk factors, determining the incidence of cancer and cancer clusters, measuring patterns of care, and understanding the determinants of survival.

CPH 718 Special Topics: Cancer Molecular Epidemiology (3) This course will consist of lectures relating to the principles of molecular epidemiology, cancer prevention, and control. Lectures include: Biomarker Discovery using proteomic techniques, Cancer Screening, Genomics and Pharmacogenomics, Cancer susceptibility: Single Nucleotide Polymorphisms and DNA Damage and DNA Mismatch Repair Genes, Cancer Risk Assessment, Cancer Diagnosis and Prognosis, Cancer Theragenesis, and Transitional Studies: Biospecimens and Bioinformatics.

Evaluation of Program

Main Goals of the Program:

- 1) Provide students with substantive methodological and quantitative preparation in the academic disciplines of biostatistics and epidemiology.
- 2) Provide advanced, research-oriented training in both theory and methodology in these disciplines.
- 3) Develop researchers who will be skilled in solving problems on the interface between biostatistics and epidemiology as they relate to designing and conducting studies as well as analyzing, and interpreting the results from increasing variety of designs and databases in the public health and medical research.

List of Goals assessed at each of the program's milestones:

Comprehensive exam: Goal 1

Qualifying Oral Exam: Goal 1 – Goal 2

Dissertation Research: Goal 3

III. Resources

The Departments of Epidemiology and Biostatistics at the University of Kentucky have sufficient resources to initiate and maintain the proposed Ph.D. program in Epidemiology and Biostatistics. Having recruited two new core faculty in 2006 (Drs. Browning and Chattopadhyay), the Department of Epidemiology now has six core faculty (the others are Drs. Caldwell, Fleming, Hopenhayn, and Tucker) and five adjunct faculty (Drs. Baron, Mannino, Coker, Steinke, McKnight, who will be active in the proposed Ph.D. program. In an ordinary academic year, the core and adjunct faculty in

the Department of Epidemiology can cover a maximum of approximately 18 courses. With the proposed Ph.D. program, the net increase in the number of courses for which the Department of Epidemiology will be responsible in an ordinary academic year is approximately 3, so that the total number of courses for which the Department of Epidemiology will be responsible in an ordinary academic year is approximately 15. Three of the six core faculty in the Department of Epidemiology are currently tenured, ensuring that dissertation advisory needs will be met on the Epidemiology side. As for the Department of Biostatistics, one new core faculty member was recruited in 2006 (Dr. Bush), one was recruited in 2007 (Dr. Wang), and one was recruited in 2008 (Dr. Fardo). The Department of Biostatistics thus has seven core faculty (the others are Drs. Branscum, Charnigo, Kryscio, and Mendiondo) and two adjunct faculty members (Drs. Shelton and Rayens) who will be active in the proposed Ph.D. program. In an ordinary academic year, the core and adjunct faculty in the Department of Biostatistics can cover a maximum of approximately 18 courses. With the proposed Ph.D. program, the net increase in the number of courses for which the Department of Biostatistics will be responsible in an ordinary academic year is approximately 7, so that the total number of courses for which the Department of Biostatistics will be responsible in an ordinary academic year is approximately 18. One of the seven core faculty in the Department of Biostatistics is currently tenured, but three of the others will be considered for (and hopefully granted) tenure by the time the students in the first cohort of the proposed Ph.D. program are ready to select dissertation advisors. Hence, dissertation advisory needs will be met on the Biostatistics side.

IV: Academic Program Approval Checklist

01: Are more Kentuckians ready for postsecondary education?

- A. Entrance requirements: Bachelor's Degree, Introductory statistics (STA 580 or equivalent), an undergraduate course in Life Sciences, two semesters of calculus.
- B. Transfer requirements: N/A
- C. Recruitment Plans: The four target audiences for this program are (i) graduates from a master's in public health with concentrations in epidemiology or biostatistics, (ii) graduates from a master's degree program in epidemiology, biostatistics, the mathematical sciences, or applied statistics, (iii) master's level graduates from psychology, computer science, engineering, business, biology, or chemistry and (iv) people who have completed undergraduate degrees in the fields listed in (ii) and (iii). We will work with all regional universities in the state and surrounding states to ensure a smooth transition from M.S. level graduate programs or relevant undergraduate programs to our doctoral program. We will create flyers to post at these institutions as well as volunteer to visit these institutions to present seminars to highlight the research programs of the faculty in the program. We also plan to work with the AMSTEM program on campus to attract students from disadvantaged backgrounds into our program.

02: Are more students enrolling?

- A. Program demand: This program is necessitated by national trends requiring qualified individuals to teach and provide consultative services in advanced epidemiology and biostatistics, especially as they apply to medical sciences and public health. The demand for such expertise is especially critical for the Commonwealth of Kentucky, which consistently ranks low in national standings for many adverse health events. In addition, graduates of this program will be able to conduct independent biomedical research in their specialization area. In the last twenty years, the demand for biostatisticians and epidemiologists has grown dramatically, as opportunities to participate in the design, conduct, and analysis of biomedical and public health research projects have continued to expand. A 2006 survey compiled by the Association of Schools of Public Health documented that 6.7% (1,892) of the students enrolled in the 38 accredited schools of public health were pursuing a degree in Biostatistics, while 19.4% were pursuing a degree in Epidemiology (5,478) (<http://www.asph.org/UserFiles/Data%20Report.2006.pdf>) . Over 40% of these students were pursuing a PhD degree. Currently, no dual Biostatistics/ Epidemiology PhD programs exist in the Commonwealth and therefore we expect a strong demand for this program from among a broad array of in-state and national and international students who are quantitatively trained at the undergraduate level and who are interested in biostatistics and epidemiology.
- B. Detailed recruiting plans: see 01.C above
- C. Equity: In accordance with University of Kentucky policy, this program will provide opportunities to people regardless of economic or social status and will not discriminate on the basis of race, color, ethnic origin, national origin, creed, religion, political belief, sex, sexual orientation, marital status, age, veteran status, or physical or mental disability (University of Kentucky, Office of Institutional Equity and Equal Opportunity, <http://www.uky.edu/EVPFA/EEO/>).

03: Are more students advancing through the system?

- A. Time to graduation: This program is designed to be completed within 4 years, however it may take some students longer.
- B. Reason for offering the program: The demand for epidemiologists and biostatisticians in biomedical research, animal health, pharmacology, genetics, and community-based research is well-documented. "There has long been a shortage of well-trained biostatisticians to collaborate with scientists in academia, industry, and government. The shortage is expected to worsen as senior biostatisticians retire." (Yang, Song; Gangon, Ronald E; Sullivan, Lisa M; Weems, Kimberly S, Summer Institutes for Training in Biostatistics (SIBS): Addressing the Biostatistician Shortage. JSM 2007 Proceedings.) This program offers a unique compilation of courses that incorporate epidemiological and biostatistical theory and application. Graduates will be prepared to actively participate in scientific research teams, assist in the writing and review of proposals, protocols, and manuscripts, design community-based and clinical trials, as well as develop methods for applied problems in

epidemiology and biostatistics. Hence, by offering the program, the University of Kentucky will help to fill the ever-increasing need for epidemiologists and biostatisticians demanded by academia, industry, and government.

- C. Delivery. Some elective courses may be delivered through distance learning.
- D. Collaborative Efforts. The departments of Epidemiology and Biostatistics are collaborating together with the College of Public Health to develop this program. In addition, the Department of Biostatistics is collaborating with the Department of Statistics to cross-list BST 762/STA 607, STA 653/ BST 763, and (STA 665/CPH 637).

04. Are we preparing Kentuckians for life and work?

- A. Graduates from this program will be able to fill positions in academia, government, and industry at high levels of professional influence. The starting salaries for doctoral prepared biostatisticians currently range from about \$87,000 in academic positions to \$140,000 in industry settings. This range is very similar for epidemiologists. Graduates who have a strong skill set in research methods, study design, and advanced statistical analysis, with a substantive focus in areas of environmental, genetic, social, injury, or infectious disease disciplines, will be well suited for higher level research opportunities. Graduates of this program should command beginning salaries in this range. This program is congruent with efforts to advance the University of Kentucky to a top 20 research institution.
- B. Accreditation expectations: This combined PhD program in epidemiology and biostatistics will be subject to the accreditation requirements of the College of Public Health and the Graduate School at the University of Kentucky. The program will be reviewed for productivity, resource utilization, placement of the graduates, and comparability with (related) peer programs in the nation.
- C. This program will be accountable to the accreditation requirements of PhD programs in the Graduate School at the University of Kentucky.
- D. Expected degree productivity: It is expected that 3-5 students will initially be admitted to the program in its first year of initiation. These students are expected to complete the program of study in 4 years. After the initial 1-2 years of experience with the program, it is anticipated that, with recruitment, demand, and increasing resources in these two Departments (i.e. faculty lines), the program will admit approximately 10 students per year.

05. Are Kentucky's communities and economy benefiting?

- A. External Advisory Groups: The College of Public Health at the University of Kentucky has an external advisory group representing public health leaders throughout the state. The Advisory Committee and other external health care groups have consistently recognized the lack of individuals in Kentucky who are trained in both Epidemiology and Biostatistics. The proposed PhD program in both Epidemiology and Biostatistics directly addresses this need.
- B. Employment expectations: The demand for individuals with training in Epidemiology and Biostatistics at the doctoral level is intense. There is a

shortage of individuals with this specific training nationally and this shortage is particularly acute in Kentucky. Anyone completing the proposed degree will be highly sought after for their unique and important knowledge and skills.

- C. Other benefits. One of the most significant problems facing Kentucky communities is unhealthy populations. These problems have been well documented. People living in Kentucky have higher rates of cancer (specifically lung cancer, colon cancer, and cancer of the uterine cervix). The Kentucky population has higher rates of obesity, heart disease, and diabetes. These health problems have devastating impact on the workforce and economy of Kentucky communities. The graduates from this program will have unique skills that will help them measure the effectiveness of no health intervention programs, including educations, screening, and treatment. Until individuals with the specific education outlined in this proposal are available, Kentucky communities will continue to suffer from health problems that can be prevented or controlled through more effective education, screening and treatment programs.
- D. Specific benefits. See above.