February 1, 2012

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Dear Colleagues:

The attached proposal for a new major in Biostatistics (Ph.D.) will be an agenda item for the February 8, 2012, Full University Curriculum Committee meeting.

Sincerely,

David E. Shipley, Chair
University Curriculum Committee

cc: Provost Jere W. Morehead
          Dr. Laura D. Jolly

Executive Committee, Benefits Committee, Committee on Facilities, Committee on Intercollegiate Athletics, Committee on Statutes, Bylaws, and Committees, Committee on Student Affairs, Curriculum Committee, Educational Affairs Committee, Faculty Admissions Committee, Faculty Affairs Committee, Faculty Grievance Committee, Faculty Post-Tenure Review Appeals Committee, Faculty/ Staff Parking Appeals Committee, Strategic Planning Committee, University Libraries Committee, University Promotion and Tenure Appeals Committee
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November 18, 2010

The University of Georgia

College of Public Health
Epidemiology and Biostatistics

Maureen Grasso
Dean, Graduate School
University of Georgia
320 Clayton Street
Athens, GA 30602

Dear Dean Grasso,

On behalf of the faculty in the Department of Epidemiology and Biostatistics in the College of Public Health, I am submitting proposals for new M.S. and Ph.D. degree programs in Biostatistics. These proposals were developed in collaboration with the Department of Statistics in the Franklin College of Arts and Sciences; a letter from John Stufken, Head of the Department of Statistics, is attached to the end of the proposal. These new degree programs are essential to the strategic objectives of our department. It builds on our current Masters of Public Health degree, which does not make efficient use of our faculty since few students choose to concentrate in biostatistics. M.S. and Ph.D. degrees are more marketable, and are essential for attaining long-term enrollment goals. In collaboration with the Department of Statistics, the proposed curricula will provide M.S. graduates the methods needed for a career in public health or biomedicine, and Ph.D. graduates with the foundations required to do methodological research in biostatistics.

The proposal has been approved by the Curriculum Committee in the Department of Epidemiology and Biostatistics, the faculty of the Department, and the Curriculum and Student Affairs Committee of the College of Public Health.

Stephen Rathbun will be the contact person for the proposal as it works its way through the University's approval process and will be available to answer any questions or present the proposal as needed.

Best Regards,

Phillip L. Williams
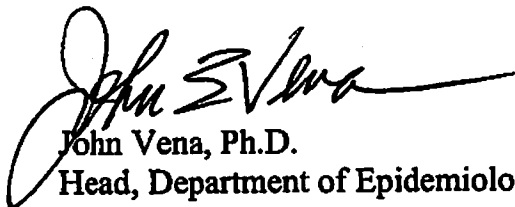Dean, College of Public Health

John Vena
Head, Department of Epidemiology and Biostatistics

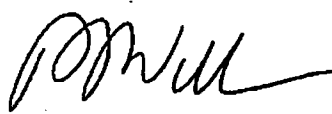Stephen L. Rathbun
Professor of Biostatistics

Institution: The University of Georgia
Date: November 2010
College: College of Public Health
Department: Epidemiology and Biostatistics
Degree: Doctor of Philosophy (Ph.D.), Biostatistics

Start Date: Fall 2011

Signatures:

John Vena, Ph.D.
Head, Department of Epidemiology and Biostatistics

Phillip Williams, Ph.D.
Dean, College of Public Health

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1. Program Abstract

The Department of Epidemiology and Biostatistics in the College of Public Health proposes a Ph.D. in Biostatistics. This new degree will build upon the currently established and accredited Masters of Public Health (M.P.H.) degree, and will meet the strategic goals of the department. The new doctoral degree will meet regional as well as national demands for biostatisticians by providing students with education necessary for interdisciplinary and collaborative research aimed at solving the most challenging biomedical and public health problems. In collaboration with the Department of Statistics, the proposed curriculum will provide a solid theoretical foundation required to develop new and innovative biostatistical methods, and experience in the application of biostatistical methods in public health and biomedicine.

2. Program Description and Objectives

The mission of the Department of Epidemiology and Biostatistics is to train public health professionals in the use of epidemiological principles and biostatistical methods and to conduct innovative research to address existing and emerging public health issues. Following the recent accreditation of the College of Public Health at the University of Georgia, implementing a Ph.D. program in biostatistics is central to the strategic objectives of the department since its founding in 2007. In the United States, biostatistics is primarily a graduate program, so a Ph.D. in Biostatistics is required for the educational mission of the department.

The Ph.D. in Biostatistics is to be created and supported in collaboration with the Department of Statistics at the University of Georgia, which already has B.S., MS., and Ph.D. programs in Statistics. The Department of Statistics will provide our students the necessary theoretical foundations to conduct biostatistical research, while the Department of Epidemiology and Biostatistics will educate Statistics and Biostatistics students in the use of state-of-the-art biostatistical methods aimed at applications in public health and biomedicine.

Biostatistics is interdisciplinary. Students are trained to collaborate on the design of clinical trials, public health surveys, and biomedical studies and the optimal analysis of the resulting data. Ideal collaborations call for the development of new and innovative biostatistical methods required to handle challenges posed by the unique features of biomedical and public health data.

A Ph.D. program in Biostatistics is consistent with Strategic Directions II and III of the 2020 Strategic Plan for the University of Georgia which call for:

II. "Enhancing Graduate and Professional Programs"

III. "Investing in Proven and Emerging Areas of Research Excellence at UGA"

With respect to Strategic Direction II, biostatistics is an interdisciplinary STEM discipline that applies mathematically-proven biostatistical methods to public health and biomedical data. Thus, a Ph.D. program in Biostatistics will support the strategic

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priority: "c) Provide further opportunities for interdisciplinary ... doctoral education to integrate faculty, course work, research programs and agreements to create a truly interdisciplinary experience for the student" and the illustrative benchmark "3) Increase the number of doctorates awarded to Science, Technology and Mathematics (STEM) disciplines by 25 percent." With respect to Strategic Direction III, Ph.D. students in biostatistics will be trained to collaborate with investigators in public health and the biomedical sciences to write the statistical content of grant proposals and to apply appropriate biostatistical methods to the resulting data. Students with such training are essential to the success of the department's Biostatistical Collaborative Unit, which provides the essential infrastructure to increase extramural funding and research productivity within public health and biomedicine through improved study design and improved quality of biostatistical analysis in research papers.

The primary objectives of the Ph.D. program in Biostatistics are:
- Provide students the theoretical foundations necessary to develop new and innovative biostatistical methods.
- Train students in optimal design of clinical trials, public health surveys, and biomedical studies.
- Enhance collaborative research with colleagues in Public Health, the Georgia Health Sciences University/University of Georgia Medical Partnership, and the Biomedical Health Sciences Institute aimed at improving the quality of study design and research papers.

3. Justification and Need for the Program

Biostatistics is one of the five core areas of public health, the other four being Environmental Health, Epidemiology, Health Policy and Management, and Health Promotion. The field of Biostatistics is an essential scientific component of biomedical, public health, and health services research involving the application and development of statistical methods to human-subjects data. Motivated by the unique ethical challenges posed by working with human subjects and by the complexity of human, biological and public health systems, biostatistical research involves the development of new and innovative statistical methods for analyzing biological data. Biostatisticians can design efficient public health surveys, clinical trials, and biomedical experiments that minimize the number of subjects exposed to inferior treatments, and maximize the amount of information obtained from the study subjects while securing the privacy of sensitive human-subjects data. Biostatisticians seek to develop new and innovative statistical methods for efficient analysis of the resulting data, yielding scientifically-defensible conclusions regarding the impact of risk factors and medical therapies on disease, quality life and health of human populations. Recent advances in biostatistical research have focused on combining information from disparate sources facilitating an interdisciplinary approach essential for resolving complex public health and biomedical issues, reducing disease risk, improving the quality of medical therapies and enhancing the quality of life for citizens of Georgia, the United States and the world.

The supply of well-trained PhD level Biostatisticians falls critically short of demand by industry, government and academia at the state, regional and national levels. The proposed PhD program in Biostatistics will help fill that demand by training students with the necessary foundations to carry out original biostatistical research aimed at developing, evaluating and illustrating new and innovative biostatistical methods for application in public health and biomedicine. Proposed methods should be based on sound theoretical foundations, demonstrating their efficacy in the applications for which they were developed. The proposed properties of new biostatistical methods are demonstrated mathematically, investigated using computer simulations, and illustrated using biomedical and public health data. Students trained in our program will fill vital roles in the pharmaceutical and medical products industries, state and federal government agencies (e.g., CDC, FDA, NIH, etc.), and academia.

A PhD program in biostatistics is also essential to support the emerging Georgia Health Sciences University/University of Georgia Medical Partnership, and existing centers and institutes at the University of Georgia including the Biomedical Health Sciences Institute, the Institute of Gerontology, the Institute of Bioinformatics, and the Center for Tropical and Emerging Diseases, to name a few. The quality of proposals to the NIH and other funding agencies from the University of Georgia will be enhanced by a PhD Biostatistics program that provides essential consulting and collaboration on study design, and data analysis.

3.1 Value Added Above Current Degrees Offered at the University of Georgia.

The College of Public Health currently offers a Masters of Public Health (M.P.H.) with a concentration in Biostatistics, and a generalist Doctorate in Public Health (Dr.P.H.). Both of these are professional degrees, and neither degree provides students with the necessary foundations to develop new and innovative biostatistical methods. While the M.P.H. trains students across the range of disciplines of public health in biostatistics, it does not provide a doctoral level of training in any content area. While Dr.P.H. students may seek substantive training in biostatistical methods aimed at their applications in public health, they do not receive the theoretical foundations necessary to develop and evaluate new and innovative biostatistical methods as is required to publish in the biostatistics literature. The Ph.D. in Biostatistics will provide students with the necessary theoretical foundations to develop, evaluate, and illustrate new and innovative biostatistical methods. With their application to public and biomedical data, critical issues in public health and biomedicine may be addressed, reducing disease risk in human populations, and improving the quality of medical therapies.

The Institute of Bioinformatics at the University of Georgia currently offers a Ph.D. in Bioinformatics. Like Biostatistics, the Ph.D. program in Bioinformatics is highly interdisciplinary. Ph.D. students in Bioinformatics obtain training in molecular genetics, biochemistry, computer science and statistics. While Ph.D. students may seek substantive training in biostatistical methods aimed at applications in bioinformatics, they do not receive the theoretical foundations necessary to publish in the biostatistics

literature. Conversely, Ph.D. students in Biostatistics may seek to develop biostatistical methods for application in bioinformatics, but they will not achieve the level of training in molecular genetics and biochemistry expected in the Bioinformatics Ph.D. program.

The Department of Statistics at the University of Georgia currently offers a Ph.D. in Statistics. Students trained under the proposed Ph.D. program in Biostatistics would receive substantive training in the epidemiological and ethical issues posed by working with human subjects and in the challenges posed by working with complex human biological and public health systems, issues that are not core to the training of Ph.D. statisticians. Efficient clinical trial designs and biostatistical methods are required to minimize the number of subjects exposed to potentially harmful therapies, and to minimize time it takes to discover beneficial therapies. Biostatisticians must be cognizant of the need to protect sensitive human-subjects data. Biomedical data are realized from complex biological processes governed by genetics, physiology, anatomy, behavior, and so on. Multidisciplinary approaches are required to meet the challenges posed by public health issues. For example, the reduction of asthma may require input from geophysicists who understand how emissions from automobiles and power plants may interact with the atmosphere to produce compounds that exacerbate asthma, input from meteorologists who understand the dispersion of such compounds by weather systems, input from physicists who understand remote sensing methods that may be used to measure those compounds, input from biologists who understand the physiological impacts of those compounds, etc. Biostatistical challenges posed by human-subjects data include nonlinear relationships among variables, categorical data analysis, survival analysis, missing data, and spatial and temporal correlations, to name a few.

3.2. Societal Need for Ph.D. in Biostatistics

Health is a key component of quality of life, and as such the quality of any human society is governed at least in part by the health of its members. Public health is "the science and art of preventing disease, prolonging life and promoting health through the organized efforts and informed choices of society, organizations, public and private, communities and individuals" (Winslow 1920). In biomedicine, efforts may focus on finding factors that may adversely impact human health, finding therapies that cure disease or minimize disease impact. Environment, behavior and biology may interact synergistically to either promote or harm health. The complexity of these interactions demands the application of state-of-the art biostatistical methods to make sense of experimental or empirical evidence. Students receiving a Ph.D. biostatistics will be trained to develop such methods, providing critical evidence required to improve the health and quality of life of citizens of Georgia, the United States and the world.

Evidence-based medicine and public health aim to apply the best available empirical evidence towards medical and public health policy decisions with the goal of achieving optimal treatment of patients, reducing disease burden, reducing costs, optimizing use of limited public health resources, and improving health and quality of life. Here, empirical evidence comes from public health surveys and scientific

experiments. Biostatisticians can design public health surveys, clinical trials and biomedical experiments that minimize the number of subjects exposed to inferior treatments, while maximizing the amount of information obtained from the study subjects. Given the resulting data, biostatisticians can apply innovative and efficient statistical methods that make best use of that information.

3.3. Workforce Need and Academic Demand

The public health workforce in the nation, and in Georgia, may not be adequately prepared to meet current needs and face future challenges in health. According to a 2008 report from the Association of Schools of Public Health, a public health workforce shortage has grown steadily since 1980. It is estimated that 23% of the current workforce, or 110,000 people, will be eligible to retire within the next four years. In fact, today there are 50,000 fewer public health workers in the US than in 1980. In Georgia, the same trends hold. The average age of the public health employee in Georgia is now 47 years and almost 35% will retire by 2012. These losses are further accentuated by the steady population growth in the US and in Georgia. If these public health workers are not replaced by skilled professionals, then the national and state infrastructures to deliver health care and disease prevention will be greatly diminished.

The gap between supply and demand in biostatistics is expected to continue to widen in part due to the key role biostatisticians play in the analysis of genomics, proteomics, and related data. A large proportion of currently senior biostatisticians in the U.S. were trained in the late 1960s and early 1970s and were supported during the early stages of their careers by the National Institutes of Health training initiative. With this cohort approaching retirement over the next decade, now is the time to invest in the training of the next generation of biostatisticians (DeMets et al. 2006).

Ph.D.-level biostatisticians are employed in the pharmaceutical and medical products industries, government at all levels in most agencies and bureaus, hospitals and clinical centers, and in academia. In the pharmaceutical industries, biostatisticians participate in all stages of clinical trials, collaborating with teams of scientists on clinical trial design, interim and data analyses, decisions regarding early termination of the trial, demonstrating the efficacy and safety of new therapies, obtaining approval of the new therapy from the Food and Drug Administration (FDA), and reporting results in the medical literature. In addition to the FDA, biostatisticians are employed by the Centers for Disease Control (CDC) and the National Institutes of Health.

Workshops sponsored by the National Institutes of Health (NIH) pointed out the growing national need for biostatisticians. The supply of new PhD graduates in biostatistics in the U.S. has been relatively steady for the past two decades, while the demand by government and industry has increased dramatically. These workshops have concluded that a renewed effort must be made in the U.S. to add and expand existing training programs to increase supply (DeMets et al. 2006).

Biostatisticians are needed to support the growing bioscience industry in the Atlanta region, which already has approximately 200 bioscience companies. State investments in biotechnology exceed 1 billion dollars, and bioscience employment exceeds 20,000 researchers, scientists, doctors, executives and staff. In 2004, over $100 million in venture capital flowed into Atlanta biotech companies (Allen 2005). Ernst and Young (2004) named Georgia eighth in the USA for total number of biotechnology companies. Atlanta is also the home of the Centers for Disease Control and Prevention (CDC), the American Cancer Society, and the Arthritis Foundation, all of whom employ biostatisticians.

3.4 Level of Interest Surveys of Current Students

Since the Department of Epidemiology and Biostatistics was formed in July 2007, we have received numerous inquiries from prospective students, asking whether we offer a doctorate in Biostatistics. At least six inquiries have been received in the past year from alumni of our M.P.H. Biostatistics program, from prospective students in Georgia and South Carolina, and from as far away as China.

To gauge the level of interest in a Ph.D. in Biostatistics, we surveyed undergraduate students currently enrolled in courses offered by the Department of Statistics, and M.S. students from the Department of Statistics. Among the 95 undergraduate students who responded to the survey, 21 were from Statistics, 21 were from Mathematical Education, 9 were from Economics, and 8 were from Mathematics. A total of 72 students expressed interest in pursuing a graduate degree. Among them, 5 expressed interest in pursuing a PhD in Biostatistics. All 5 of those students said that they would seriously consider attending a doctoral program at the University of Georgia.

A total of 6 M.S. students from the Department of Statistics responded to our survey. Of them, half expressed interest in pursuing a PhD in Biostatistics, and all of these students said that they would seriously consider a doctoral program at the University of Georgia.

Based on the results of our survey, current students from the University of Georgia are supportive of and are interested in a doctoral program in Biostatistics at the University of Georgia College of Public Health. With recent accreditation of the College, and opportunities to collaborate with the forthcoming Georgia Health Sciences University/University of Georgia Medical Partnership, the Biomedical Health Sciences Institute, and the Institute of Bioinformatics, we expect interest in the doctoral degree to increase.

3.5 Public and Private Institutions Offering a Ph.D. in Biostatistics

In Georgia, the Georgia Health Sciences University is the only state institution, and Emory University is the only private institution that offers a Ph.D. in Biostatistics. In the

southeast, Ph.D. programs in biostatistics may be found at the University of North Carolina Chapel Hill, the University of Alabama Birmingham, the University of Florida, the University of South Carolina, the University of Kentucky, the University of Louisville, Florida State University, the University of South Florida, and Tulane University.

3.6 Reports from Consultants

A draft of this proposal was sent to five prominent biostatisticians for review. Their letters may found in the appendix. The following summarizes the qualifications of the two consultants who responded:

Lance Waller is Rollins Professor and Chair of the Department of Biostatistics and Bioinformatics at Emory University. He is a past president of the International Biometric Society, the premier international professional society in biostatistics. He is also an Associate Editor for *Biometrics* and *Bayesian Analysis*, and has published 76 papers in peer-reviewed journals.

Thomas A. Louis is Professor of Biostatistics at Johns Hopkins University. He is a past president of the International Biometric Society, the premier international professional society in biostatistics. He is a Fellow of the American Statistical Association, a Fellow of the American Association for the Advancement of Science, and a member of the International Statistical Institute. He is currently the editor of *Biometrics*, and has also been an editor of the *Journal of the American Statistical Association, Statistical Science,* and *Chance*, and Associate Editor for *Controlled Clinical Trials, Statistica Neelandica,* a member of the editorial board of *Biostatistics, Clinical Trials,* and *Statistics in Medicine*, and has 170 papers in peer-reviewed journals.

Both Tom Louis and Lance Waller used track changes to insert their comments into the draft documents of our proposals. Lance Waller did not make any substantive comments regarding the PhD proposal. Tom Louis made the following substantive comments:
1. Does BIOS 8030 Longitudinal Data Analysis include event-time analysis?
2. Can the required core courses in epidemiology and public health be broadened to allow more depth in Environmental Health, Health Policy, and Behavioral Science rather than having everyone epi-immersed.
3. You need at least one course in Statistical Computing, Monte Carlo methods, etc.

With respect to item 1, we agree that students should have exposure to event-time analysis, so we have added this to the content of BIOS 8030 as suggested. The original version of this proposal requires students to take six credits of epidemiology and 2 credits of PBHL 8200 Seminar in Public Health. PBHL 8200 is intended to expose students to environmental health, health policy and health promotion and behavior as well as epidemiology. However, we acknowledge the benefits being more flexible, and now require students to take 3 credits in epidemiology, and 3 credits in one of the three remaining areas of public health: environmental health, health policy, and health

promotion and behavior. With respect to item 3, we added the requirement that students take STAT Computing Techniques in Statistics I.

4. Procedures to Develop Program

The development of a Ph.D. program in Biostatistics is part of the strategic plans of the College of Public Health and the Department of Epidemiology and Biostatistics. This proposal was developed in collaboration with the Department of Statistics at the University of Georgia, and in response to a thorough review of the curricula of aspirational biostatistics departments throughout the United States. Our aim was to develop an innovative program while maintaining the essential elements of training in biostatistics.

Establishing itself as a state and national leader in public health was a primary goal of the public health initiative at UGA. Following the creation and approval of a Masters in Public Health (MPH) in 2004, the University System of Georgia's Board of Regents approved the formation of the College of Public Health.

Since 2005, the College has implemented a successful campaign to recruit senior faculty to leadership positions in the College. One of the newly formed departments was the Department of Epidemiology and Biostatistics. Within 4 years of launching the College, this department has grown from just 1 faculty member to now 13 full time faculty members and 6 adjunct members within the University. These faculty are now engaged in teaching graduate level courses at the masters level and are developing federally funded research programs.

In the Fall 2008, the faculty approved the idea of developing an M.S. program in the Department of Epidemiology and Biostatistics. During a departmental retreat, in the spring of 2009, Dr. Rathbun, Associate Head of the department, was assigned the responsibility of developing the application. Specifically for this application, Dr. Rathbun and his colleagues reviewed the current workforce needs in Biostatistics as published in Statistics in Medicine (DeMets et al., 2006), and the curricula of prominent and aspirational biostatistics programs throughout the United States. A survey of current undergraduate and graduate students in the Department of Statistics was conducted to gauge the level of interested in a doctoral biostatistics program. The proposed doctoral curriculum was developed and reviewed by the faculty in Biostatistics. The draft proposal was prepared by the Biostatistics faculty in consultation with Dr. John Stufken and Dr. Daniel Hall from the Department of Statistics. The draft proposal was reviewed by the College of Public Health Academic Affairs and Curriculum Committee in its June 9, 2010 meeting. The proposal was then revised according to the comments of the Academic Affairs and Curriculum Committee. On August 3, Rathbun, Vena and Whalen met with Dean Williams from the College of Public Health to discuss the proposal. On August 6, a revised version of this proposal was forwarded to the Department of Statistics for endorsement, and to five external reviewers; see Section 3.6 for the names and credentials of the two external reviewers who responded. Reviews were received from

Dan Hall (UGA Department of Statistics) Thomas Louis (Johns Hopkins) and Lance Waller (Emory) by September 7, 2010. The proposals were then revised according to the reviewers' comments. The proposal was submitted to Dean Grasso of the Graduate School on November 29, 2010. Dean Grasso reviewed the proposal and returned constructive comments on January 20, 2011. The proposal was then revised according to those comments and returned to the Graduate School for review on February 8, 2011.

5. Curriculum

The degree of Doctor of Philosophy in Biostatistics will be awarded in recognition of in-depth knowledge and comprehensive understanding of Biostatistics together with a demonstrated ability to perform independent research contributing new and innovative biostatistical methods. In this program, students will acquire expertise in biostatistics by taking and passing a series of core and elective courses, and completing a dissertation under the direction of a faculty mentor. Expertise in biostatistics will be demonstrated by passing written and oral comprehensive examinations. Proficiency in independent research will be demonstrated by successful completion of a doctoral dissertation, whose content is deemed to be publishable in peer-reviewed biostatistics journals.

5.1 Acceptance to the Program

Students applying to this program will be required to have completed a Baccalaureate degree from an accredited institution with demonstrable mathematical preparation including at least three semesters of calculus (i.e., differential, integral, and multivariate calculus) and a course in linear algebra. Students with undergraduate degrees in mathematical sciences (i.e., mathematics, statistics, biostatistics, computer science, etc.), the biological sciences, or public health are encouraged to apply. A Master's degree in statistics or biostatistics is not necessary to be admitted to the Ph.D. program. Admitted students will also have demonstrated adequate mathematical training in calculus. Applications to the Ph.D. program will be reviewed by Departmental faculty and offers of acceptance made to qualified candidates. According to their qualifications, students will either be admitted to the M.S. or Ph.D. programs.

Admission will be based on evaluation of the applicant's educational background and any work experience, past performance, and potential to provide leadership in the field of Biostatistics. In addition to the prerequisites above, other admission requirements will include:
- Official GRE test scores sent by the testing agency to the Graduate School.
- Official transcripts from each institution attended (International applicants must submit official academic record and proof of degrees in English.) .
- Completion of the College of Public Health's admissions questionnaire, personal statement and School of Public Health Application Service (SOPHAS) application
- Current resume or curriculum vitae

- Three letters of recommendation from former teachers, employers, or other individuals who are familiar with the applicant's potential to complete the rigorous requirements of the degree.
- International applicants from non-English speaking countries must submit the results of the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS), as well as any additional information required by the Office of International Education at UGA.

5.2 Competencies

The Department of Epidemiology and Biostatistics embraces competency-based education as set forth by the Association of Schools of Public Health. Students receiving a Ph.D. in Biostatistics should meet the following competencies:

1. Demonstrate a command of core biostatistical techniques, including their computation, theoretical underpinnings, and their application in public health and biomedicine.
2. Work independently as a collaborator with public health and biomedical researchers to design clinical trials, case-control studies, public health surveys, and other experimental and observational studies.
3. Conduct and publish original research on the theory and application of biostatistics aimed at developing new and innovative methods for analysis of public health and biomedical data.
4. Communicate effectively with investigators in public health and biomedical research.
5. Teach biostatistics to undergraduate students in public health, biomedicine, and related fields.
6. Demonstrate and practice ethical research as it pertains to data management, analysis, and interpretation.
7. Critically review the statistical literature, and the statistical content of the public health and biomedical literature.

5.3 Coursework for Ph.D. Biostatistics

The proposed program requires 68 credits to complete the Ph.D. degree in Biostatistics, including 38 credits of core courses in Biostatistics, Statistics and Epidemiology, 12 credits of approved electives, and 18 credits of dissertation research. Core courses are aimed at competencies 1-6.

Required Core Courses in Biostatistics and Statistics (33 credit hours)

BIOS 8010 (3 credits). Regression and ANOVA
BIOS 8020 (3 credits). Linear and Generalized Linear Models
BIOS 8030 (3 credits). Longitudinal Data Analysis
BIOS 8040 (3 credits). Advanced Biostatistical Methods
BIOS 8310 (3 credits). Advanced Inference in Biostatistics

BIOS 8320 (3 credits). Asymptotic Inference in Biostatistics
BIOS 8200 (4 credits). Biostatistical Consulting
BIOS 8920 (2 credits). Biostatistics Seminar
STAT 6810 (3 credits). Probability Distributions
STAT 6820 (3 credits). Statistical Inference
STAT 8060 (3 credits). Computing Techniques in Statistics I

Biostatistical research involves the development of new and innovative methods for statistical analysis of biomedical and public health data. To carry out that research, students need a solid theoretical foundation so that they can critically review the statistical literature, propose new biostatistical methods, and mathematically evaluate their statistical properties. STAT 6810, STAT 6820, BIOS 8310 and BIOS 8320 are designed to provide students the necessary theoretical foundations.

The BIOS 8010-8040 sequence exposes students to the breadth of biostatistical methods applied to public health and biomedical data. An integrative approach is taken, under which the theoretical foundations of each method is considered, as well as its application to data. It is our intent to include some theory in these applied courses so that students may comprehend the role that theory plays in the development of new biostatistical methods by observing its role in the development of extant methods.

Students are to take 2 semesters of BIOS 8200 Biostatistical Consulting for 2 credit hours each. These courses provide students with experience in biostatistical consulting by providing opportunities to collaborate with other investigators in public health and biomedicine. Here, they will consider the practical aspects of designing clinical trials, public health surveys and other experimental studies. Oral and written communications skills will be developed. Ethical guidelines for biostatistical consulting, and data analysis will be explored.

Modern research in biostatistics often involves the development of new and innovative computational algorithms employing numerical optimization methods, numerical integration, and Monte Carlo techniques. STAT 8060 will provide the necessary education in modern computational tools required for biostatistics research.

Students entering the program with an M.S. in either Biostatistics or Statistics may exempt one or more of the above required core courses under permission of the Department of Epidemiology and Biostatistics. However, such students must replace exempted courses with qualified electives so as to maintain the total number of credit hours required for the degree.

Required Core Courses in Epidemiology and Public Health (8 credit hours)

EPID 7010 (3 credits). Introduction to Epidemiology 1

PBHL 8200 (2 credits). Seminar in Public Health

In addition, students must take one of the following public health courses:

EHSC 7010 (3 credits) Fundamentals of Environmental Health Science
HPAM 7010 (3 credits) Introduction to Health Policy and Management
HPRB 7010 (3 credits) Social and Behavioral Foundations in Public Health

The College of Public Health requires that all students receiving degrees within the college should be exposed to the full range of public health disciplines, approaches, and institutions. To meet this requirement, students are to take two semesters of the public health seminar for one credit each. Further exposure and more in depth exposure is provided by the required course in epidemiology and requiring students to take a course in one of the remaining three disciplines of public health. Epidemiology involves the application of biostatistical methods to describe risk factors for disease. Courses in epidemiology provide a more in-depth consideration of the science that underlies the application of those methods than courses in biostatistics.

Electives in Biostatistics, Epidemiology and Statistics

Students may choose electives from among all 8000 level courses in Statistics and Biostatistics in addition to BIOS 6380 and BIOS 7400. Students with interests in Bioinformatics or Epidemiology may select from 8000 level courses in those two programs. The following is a sample of suggested elective courses:

BINF 8210 Computational Methods in Bioinformatics
BINF 8211 Advanced Methods for Biological Data Analysis
BINF 8940 Applied Genome Analysis
BIOS 6380 Survival Analysis
BIOS 7400 Research Data Management and Computing
BIOS 8100 Case Studies in Nonlinear Biostatistics
BIOS 8110 Categorical Data Analysis
BIOS 8120 Applied Nonparametric Biostatistical Methods
BIOS 8130 Multivariate Design
BIOS 8220 Clinical Trials
EPID 8010 Cohort Study Design, Implementation and Analysis
EPID 8020 Case Control Design, Implementation and Analysis
EPID 8250 Biomarkers
STAT 8040 Environmental Statistics
STAT 8060 Computing Techniques in Statistics I
STAT 8070 Computing Techniques in Statistics II
STAT 8090 Statistical Analysis of Genetic Data
STAT 8170 Probability Theory I
STAT 8180 Probability Theory II
STAT 8240 Sampling and Related Topics

STAT 8260 Theory of Linear Models
STAT 8270 Spatial Statistics
STAT 8280 Time Series Analysis
STAT 8290 Advances in Experimental Designs
STAT 8300 Multivariate Analysis
STAT 8330 Advanced Applications and Computing
STAT 8350 Bayesian Data Analysis
STAT 8560 Advanced Theory of Nonparametric Statistics
STAT 8650 Bootstrapping Techniques
STAT 8700 Applied Stochastic Processes
STAT 8730 Sequential Analysis

Sample Program of Study

This is a typical sequence of courses for the first two years. In addition to the courses listed here, students should complete 2 semesters of PBHL 8200 Public Health Seminar within the first two years, and 2 semesters of BIOS 8920 Biostatistics Seminar by their third year. In subsequent years, students complete electives to meet their degree requirements.

Year	Fall	Spring
Year 1	BIOS 8010 Regression and ANOVA	BIOS 8020 Linear and Generalized Linear Models
	STAT 6810 Probability Distributions	STAT 6820 Statistical Inference
	EPID 7010 Introduction to Epidemiology I	Public Health Course
	elective	elective
Year 2	BIOS 8030 Longitudinal Data Analysis	BIOS 8040 Advanced Biostatistical Methods
	BIOS 8310 Advanced Inference in Biostatistics	BIOS 8320 Asymptotic Inference in Biostatistics
	BIOS 8200 Biostatistical Consulting	BIOS 8200 Biostatistical Consulting
	STAT 8060 Computing Techniques in Statistics I	elective

New Courses

To meet the educational objectives of the doctoral program in Biostatistics, the Department has developed the following courses. These courses will be completed in the first two years before advancing to candidacy.

BIOS 8010 (3 credits). Regression and ANOVA. This course will begin with coverage of simple and multiple linear regression, data transformations, weighted regression and various aspects of model assessment and model selection. Then analysis of variance (ANOVA) procedures and designs will be studied, including one-way and multi-way ANOVA, contrast estimation, multiple comparison procedures, block and Latin square designs, and missing and unbalanced data. Emphasis is given to the application of regression and ANOVA in public health and biomedicine. (Developed by Kevin Dobbin)

BIOS 8020 (3 credits). Linear and Generalized Linear Models. This course extends linear model methods covered in BIOS 1 to methods for analysis of data with non-iid errors, including generalized linear models for data with nonconstant

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variance, quasi-likelihood for over-dispersed data, log-linear models, conditional likelihoods, marginal likelihoods, and several methods for correlated data such as random effects and mixed models, analysis of repeated measures, longitudinal data analysis, and generalized estimating equations. Emphasis is given to the application of linear and generalized linear models in public health and biomedicine. (Developed by Sangwook Kang)

BIOS 8030 (3 credits). Longitudinal Data Analysis. Students are introduced to statistical models and methods for the analysis of longitudinal data, including univariate and multivariate repeated measures analysis of variance, event-time data analysis, general linear model for correlated continuous data, generalized linear models, generalized estimating equations and generalized linear mixed effects models. Emphasis is given to the application of longitudinal data analyis in public health and biomedicine. (Developed by Xiao Song)

BIOS 8040 (3 credits). Advanced Biostatistical Methods. Use of modern computationally-based methods for exploring and drawing inferences from data. Emphasis is on the methods and their practical applications. The course covers resampling methods, non-parametric regression, prediction, and dimension reduction and clustering. Specifically covers: Monte Carlo simulation, bootstrap cross-validation, splines, local weighted regression, CART, random forests, neural networks, support vector machines, and hierarchical clustering. Emphasis is given to modern methods for analyzing public health and biomedical data. (Developed by Woncheol Jang)

BIOS 8200. (2 credits). Biostatistical Consulting. Biostatistical consulting skills needed to deal with clients, formulate statistical models, explain analyses, use standard statistical computer packages, and write reports in language understandable to the client. This course may be repeated for credit up to a maximum of 4 hours. (Developed by Stephen Rathbun)

BIOS 8310 (3 credits). Advanced Inference in Biostatistics. Following an overview of probability measures and distribution functions, modes of convergence, laws of large numbers and central limit theorems, decision theory, hypothesis testing and Bayesian inference are considered. Emphasis is given to results needed to develop and evaluate biostatistical methods, rather than rigorous mathematical proofs. (Developed by Stephen Rathbun)

BIOS 8320 (3 credits). Asymptotic Inference in Biostatistics. Asymptotic inference for maximum likelihood estimators, M-estimators, U-statistics, and nonparametric and semiparametric models. Consistency, asymptotic normality, and asymptotic efficiency are considered. Both independent and dependent data cases are included. Emphasis is given to results needed to develop and evaluate biostatistical methods, rather than rigorous mathematical proofs.
(Developed by Stephen Rathbun)

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BIOS 8920 (1 credit). Biostatistics Seminar. Invited speaker seminar series to expose graduate students in biostatistics to current research in biostatistics. (Developed by Woncheol Jang)

5.4 Admission to Candidacy

After completing the first year of course work, students are to sit for the qualifying examination, which will cover the material in the first-year core courses, BIOS 8010-8020, and STAT 6810-6820. Students may pass at the Ph.D. level, pass at the Master's level, or fail the examination. Students failing the exam, have one opportunity to retake it. Students passing at the M.S. level will meet with the graduate coordinator and their advisor to discuss whether they should retake the exam or be encouraged to complete a Master's Thesis and graduate with an M.S. degree after they complete their second year. Student failing to the exam at the Ph.D. level in their second attempt can complete a Master's Thesis and graduate with an M.S. in Biostatistics provided that they have passed at the Master's level in at least one of their two attempts.

Before completion of the second year, students must form a four-member advisory committee in consultation with a faculty advisor. At least two, but no more than three members must be selected from either the Department of Epidemiology and Biostatistics, or the Department of Statistics. In keeping with the interdisciplinary objectives of the Ph.D. program in Biostatistics, at least one member of the advisory committee should not belong to either of the above departments.

To be admitted to candidacy for the Ph.D. in Biostatistics, students must first pass a written comprehensive examination covering the material in BIOS 8010-8040 and BIOS 8310-8320. Students failing the comprehensive examination will have one opportunity to retake the exam. With approval from the graduate coordinator, students failing the exam second time may complete a Master's Thesis and graduate with an M.S. in Biostatistics. After the written examination is completed, students will schedule an oral examination to be given by the advisory committee. This oral examination may cover any of the courses in the core curriculum as well as elective courses relevant to their research topic. A student is admitted to candidacy following the successful completion of this oral examination.

After being admitted to candidacy, students must write a prospectus, describing the proposed research to be completed for their doctoral dissertation. This prospectus must be defended before the student's committee at least 2 semesters prior to their dissertation defense. After the prospectus has been approved, the candidate will carry out the proposed research on biostatistical methodology and/or theory under the direction of their advisor. The results of this research must be communicated in a written dissertation satisfying the guidelines established by the University of Georgia. The research must constitute an original contribution to the science of statistics and may derive new results in statistical theory or methodology or may be concerned with developing statistical

methodology in new areas of application. Once the student's advisor feels that the student has completed the dissertation, a final oral examination is conducted by the advisory committee in which the student defends the dissertation.

6. Inventory of Faculty

The Department of Epidemiology and Biostatistics has grown rapidly in the past two years and has recruited top-level faculty members at all ranks. All members of the faculty have outstanding records of teaching and research. The Biostatistics faculty has a solid foundation in the theory and practice of biostatistics with expertise in survival analysis, spatial statistics, bioinformatics, and data mining. The Epidemiology faculty includes experts in infectious disease epidemiology, cancer epidemiology, chronic disease epidemiology, mathematical modeling and food security.

There are 13 primary and 3 adjunct faculty members in the Department of Epidemiology and Biostatistics (Table 6.1). Of the 12 primary faculty, 4 in Biostatistics and 8 specialize in Epidemiology. There are 4 full professors, 1 associate professor, and 8 assistant professors. Due to the recent departure of one Biostatistics faculty member, the department is currently recruiting for an open position at the assistant professor level. The Department has the content expertise, experience, research productivity, and size to support a Ph.D. program in Biostatistics.

6.1. List of Faculty, rank, credentials, etc (Adjunct)

Name	Rank	Credentials	Program Role
Mark Ebell	Associate Professor	M.D. 1987	Teaching and Research Faculty
Robert Galen	Professor	M.D. 1970 M.P.H	Associate Dean Teaching and Research Faculty
Andreas Handel	Assistant Professor	Ph. D. 2004	Teaching and Research Faculty
James Oloya	Assistant Professor	D.V.M. 1992 Ph. D. 2006	Teaching and Research Faculty
Steven Valeika	Assistant Professor	D.V.M. 2001 Ph. D 2008	Teaching and Research Faculty
John Vena	Professor	Ph. D. 1980	Department Chair
Christopher Whalen	Professor	M.D. 1984 M.S. Epidemiology 1992	Program Coordinator
Claire Robb	Assistant Professor	Ph. D. 2003 MPH 2003	Teaching Faculty and Research
Kevin Dobbin*	Assistant Professor	Ph. D. 2001	Teaching Faculty and Research
Woncheol Jang*	Assistant Professor	Ph. D. 2003	Teaching Faculty and

			Research
Stephen Rathbun*	Professor	Ph. D. 1990	Teaching Faculty and Research
Xiao Song*	Assistant Professor	Ph. D. 2002	Teaching Faculty and Research
Adjunct Faculty			
Claude Burnett	Adjunct Associate Professor	M.P.H. M.D.	Teaching Faculty
Al Langford	Adjunct Professor	M.D.	Teaching Faculty
Anil Mangla	Adjunct Assistant Professor	M.P.H. Ph. D.	Teaching Faculty
Michael Schmidt	Assistant Professor, Kinesiology,	Ph.D., 2005	Teaching and Research Faculty .
David Stallnecht	Professor, College of Veterinary Medicine	Ph.D.	Teaching and Research Faculty
Roy Berghaus	Assistant Professor, Department of Population Health College of Veterinary Medicine	D.V.M., 1994 Ph.D., 2006	Teaching and Research

*Biostatistics Faculty

The Biostatistics faculty in the Department is academically productive. Over the past five years, primary faculty members have published 45 articles in their respective fields. Many of these publications appeared in top level specialty journals in Statistics or Biostatistics.

The excellent level of scholarship has been supported by federally funded research and training grants to members of the Department. All members of the department are principal investigators or co-investigators on one or more grants. Total award amounts exceed $10 million. This funding will provide an excellent base to support pre-doctoral students in the program as well as access to current research projects directed by faculty.

6.2. Biostatistics Faculty Scholarship and publication during past 5 years

Name	Articles	Book Chapters	Reports	Reviews/Editorials	Invited Presentations
Woncheol Jang	8	1	0	22	13
Kevin Dobbin	7	1	1	35	7
Stephen Rathbun	8	2	0	35	6
Xiao Song	8	0	0	20	7

6.4 Department Current grant support

Primary Investigator	Title of Grant	Grant Agency and Number	Annual Costs	Total Amount of Grant	Number of Years Awarded
Mark Ebell	Using Physician Questions	2010-10222-0	$50,000	$50,000	1

	at the Point of care as a Needs Assessment for Continuing Education				
Andreas Handel	Quantitative Studies of CD8 T-cell Dynamics	5K25AI072193			5
John Vena	Georgia Cancer Coalition	038505	$150,000	$750,000	5
John Vena (Co-Investigator)	Impact of Physical Activity on Stroke and Cognitive Function in Older Adults	NIH R01		$3,569,616	5
John Vena (Co-Investigator	The New York State Angler Cohort Study	NIH 1 R01 TS000077-01	$126,107		5
John Vena (Co-Investigator	Environmental Determinants of Pulmonary Disease: A New Approach to an Old Problem	1 KO EH000287-01	$138,889	$450,000	3
John Vena (Co-Investigator	Environmental Determinants of Systemic Lupus Erythematosus Among African Americans in Coastal Carolina and Georgia	NIH 1R21ES017934 – 01		$1,325,327	4
Woncheol Jang	Development of Software for Comparative/Quantiative Clinical Proteomics	2R42GM083525-02			1
Steven Valeika (Co-Investigator)	Risk Analysis of Avian Influenza Infection from Recreational Exposures to Freshwater	(CDC)		$2,600,000	5
Christopher Whalen	AIDS	NIH TW00011			5
Christopher Whalen	Uganda HIV/TB COHRE Training Program	NIH TW06900			5
Christopher Whalen	HIV TB Therapeutic Trial	NIH aIXXXXXX			7
Xiao Song	Statistical Designs for Marker Validation Studies in Treatment Elections	VA (IPA)	$24,012		2
Xiao Song	Functional Methods for Radiation Exposure and Biomarker Data	NIH R01 ES2017030	$31,334		3
Stephen Rathbun	A Probability-Sampling Framework for Modeling the Impact of Time-Varying Covariates on Event History Data	National Science Foundation SES-0720195		$236,240	3
Stephen Rathbun	Probability-Sampling Framework for Modeling the Impact of Time-Varying Covariates: Ecological Momentary Assessment of Smoking	NIH 1RO1DA024687-01		$336,899	3
Kevin Dobbin	Georgia Cancer Coalition		$50,000	$250,000	5

6.5. Roles and Responsibilities in Proposed Program

The primary faculty will both teach courses and act as the research mentors for doctoral students. The department is currently committed to teaching the undergraduate Biostatistics course (BIOS 2010), two courses in the MPH program (BIOS 7010 and BIOS 7020), as well as three elective courses supporting the MPH (BIOS 6380, BIOS 8110 and BIOS 8220). The PhD curriculum calls for the addition of six new core courses and two sections of the consulting course (BIOS 8200) to our program. Faculty are currently assigned to teach 4 courses per year. The following table outlines teaching assignments for a typical year in the program demonstrating that the courses can be handled by the five faculty lines in biostatistics in the department. Courses in italics are electives that may not be taught every year, and may be replaced by alternative electives from year to year. Additional electives may be taken from the in epidemiology, the Department of Statistics, or other departments according to individual student interests as approved by their committees.

Fall Courses	Spring Courses
BIOS 2010 (new hire)	BIOS 2010 (Dobbin)
BIOS 7010 (Rathbun)	BIOS 6380 (Song)
BIOS 7400 (new hire)	BIOS 7010 (Dobbin)
BIOS 8010 (Dobbin)	BIOS 7020 (Jang)
BIOS 8030 (Song)	*BIOS 7400 (new hire)*
BIOS 8110 (Jang)	BIOS 8020 (new hire)
BIOS 8130 (Rathbun)	BIOS 8040 (Jang)
BIOS 8200 (Dobbin)	BIOS 8200 (Rathbun)
BIOS 8220 (Song)	BIOS 8320 (Rathbun)
BIOS 8310 (Jang)	BIOS 8920 (Song)

The department will initially admit 2-3 doctoral students per year. For a five-year doctoral program, this translates to 10-15 students that will require advisors, or about 2-3 students per graduate faculty member in the department. Since students in the first two years of the program focus on their coursework, this means that each faculty should have only 1-2 students actively engaged in research at a time.

The Head of the Department will appoint a Graduate Coordinator of the Department who will oversee the doctoral program. The graduate coordinator will be responsible for approving plans of study, notifying the Graduate School when a student advances to candidacy, addressing curricular needs, and assigning research mentors. The graduate coordinator will keep the faculty informed about the progress of students at regular faculty meetings.

7. Programs at Other Institutions

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This section reviews Ph.D. programs in the Southeast. Two colleges and universities in Georgia currently offer Ph.D. program (Georgia Health Sciences University (GHSU), and Emory University). Biostatistics is the application of statistics to biology and the health sciences. The current demand for biostatisticians far exceeds the supply and the gap is expected to continue to widen. This undersupply results from a combination of burgeoning need and a relatively flat rate of graduating doctoral level biostatisticians. The University of Georgia is strategically situated to develop a Ph. D. program that can meet this need.

More than 9 Southeastern universities already offer a Ph.D. degree.

7.1 State of Georgia

1) Public

Georgia Health Sciences University, School of Graduate Studies, Department of Biostatistics: The Department of Biostatistics was formed in 2004 from its previous status as the Office of Biostatistics. The primary objective is to provide individuals with rigorous training in applied and theoretical statistics in order to prepare them for careers as doctoral-level biostatisticians.

2) Private

Emory University, Rollins School of Public Health, Department of Biostatistics and Bioinformatics: The Department of Biostatistics and Bioinformatics at Emory University was established in the early 1960's as the Department of Statistics and Biometry in the School of Medicine. The Department has 16 full-time doctoral faculty, eight associate faculty, and eighteen adjunct faculty as of Fall 2009. As of Fall 2009, there were 30 PhD students, 17 MSPH students, and 8 MPH students in Biostatistics.

7.2 Ph.D. programs in the Southeast

Among institutions offering a Ph.D. program in the Southeast, we introduce only institutions which are CEPH-accredited schools of public health that offer Ph.D. programs.

University of Alabama (UAB) - Birmingham: The Department of Biostatistics offers a Ph. D. degree in Biostatistics through the UAB Graduate School. This program provides a balance between theory and application, the perspective being the role of statistics and modeling in scientific research. This program requires 57 hours of course work including 33 hours in the biostatistics core, 18 hours of biostatistics electives and 6 hours of outside electives.

University of Florida: Its Ph.D. program in Biostatistics in the College of Health and Health Professions requires a directly related master's degree (i.e. Master of Science in statistics or biostatistics). All students must complete a minimum of 54 credits of biostatistics/statistics course work, 6 credits of public health course work, 3 credits of a consulting requirement, 6 credits of the cognate requirement, and 21 credits of dissertation work.

University of Kentucky: It offers a Ph.D. program in Epidemiology and Biostatistics through the Department of Epidemiology and Biostatistics in the College of Public Health. Unlike traditional doctoral preparation in either discipline alone, this 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.

University of Louisville: In addition to the advanced training in biostatistical theory and methods, students in its Ph.D. program may elect to train with an emphasis on decision science or on bioinformatics. This program requires 34 hours of coursework beyond what is required for the M.S., including 25 hours of required coursework and 9 hours of electives.

University of North Carolina (UNC) – Chapel Hill: The Department of Biostatistics was established in 1949. Its Ph.D. program is designed to provide advanced, research-oriented training in theory and methodology to prepare individuals for academic careers and for research positions in government and private industry. The program requires 51 hours of coursework including 33 hours of required courses, 6 hours in the supporting program and 12 hours of electives.

University of South Carolina (USC) – Columbia campus: USC offers a Ph. D program in Biostatistics through the Department of Epidemiology and Biostatistics in Arnold School of Public Health. This 51 credit hour program requires 9 hours of core courses in Biostatistics, 12 hours of core courses in Statistics, 6 hours of electives from biostatistics or statistics, 9 hours of cognates, 3 hours of seminar and 12 hours of dissertation research.

University of South Florida: Its Ph.D program in biostatistics is provided through the Department of Epidemiology and Biostatistics, College of Public Health. It requires a strong quantitative background and a Master's degree in a closely related field prior to admission. The Ph.D. degree Biostatistics requires a minimum of 90 credit hours, including 52 hours of coursework with at least 18 in biostatistics concentration areas, 6 in research tools, 9 in a minor study field, 1-3 hours of interdisciplinary seminar, and 18 hours of dissertation research.

Tulane University: It offers a Ph.D program in Biostatistics through School of Public Health and Tropical Medicine. A minimum of 60 credits of didactic coursework is required including 21 hours in the biostatistics core, 3 hours in the epidemiology core, 2 hours of seminar, 9 hours in the mathematics core, 3 hours of mathematics electives, and 22 hours of biostatistics electives.

7.3 Outstanding Programs of this Nature in Other Institutions

Using a variety of variables, *U.S. News and World Report* annually ranks schools of public health. In 2010, the top five schools of public health rated by *US News and World Report* were: 1) Harvard University, 2) University of Washington, 3) Johns Hopkins University, 4) University of North Carolina at Chapel Hill, and 5) University of Michigan, Ann Arbor. All these five schools offer Ph.D. programs in Biostatistics. Although this ranking is not directly translated into the rankings in Biostatistics, the

consensus is that these are top five programs and, among them, Johns Hopkins University, Harvard University and University of Washington are top three programs.

In the Southeast, two accredited programs are worthwhile to mention. UNC Gillings School of Global Public Health is not only one of the largest public health schools in the country with more than 200 full-time faculty and 1,700 students, it is one of the most consistently recognized for excellence. They are ranked as the top *public* school of public health in the nation by *U.S. News & World Report* (2008 edition) and second place among all public health schools. The Department of Biostatistics was established in 1949 and maintains its reputation as one of the strongest academic units in the UNC Gillings School of Global Public Health, and stands as one of the best departments of its kind in the world. It also is one of the largest in number of students and faculty. The numbers of full time faculty and students as of fall 2009 were 46 and 155 (17 in B.S.P.H. undergraduate program , 11 in M.P.H., 26 in M.S., 30 in Dr.P.H., and 71 in Ph.D.). The Ph.D. program is designed to provide advanced, research-oriented training in theory and methodology to prepare individuals for academic careers or for research positions anywhere. The program requires an appropriate prior Bachelor's or Master's degree in Statistics, Biostatistics, or in a closely related field. The Gillings School of Global Public Health requires a minimum of 18 semester hours of course work beyond the Master's degree for admission to candidacy and to dissertation and research courses. The Department's program curriculum consists of 6 components: Mathematics, Statistical Computing and Data Management, Basic Statistics, Advanced Statistics, Supporting Program, and Practicum. Mathematics required is training in Advanced Calculus and Linear Algebra. The requirement on Statistical Computing and Data Management is self-enforcing. Courses on Basic Statistics are mostly included in a typical MS program. Courses on Advance Statistics consist of 6 required courses and at least 12 semester hours of elective courses. A supporting program of at least 6 hours, including a course in the introduction to epidemiology is required. Practicum includes two courses in statistical consulting and grading of up to 3 courses. In addition, all doctoral students must register for a minimum of 6 credit hours of dissertation work and complete a minimum residence credit of four full semesters, at least two of the required four semesters of residence must be earned in contiguous registration.

A Ph.D. program in Biostatistics that is similar to UGA's proposed program is that of the University of South Carolina. Its program in Biostatistics is housed in the Department of Epidemiology and Biostatistics. The program prepares students, through quality lecture and practical experiences and other research opportunities, for involvement in teaching and independent and collaborative biostatistical research; and trains researchers to teach and to pursue original research on analytical approaches to investigating health conditions, and to develop novel biostatistical approaches. The degree requires a minimum of 51 semester hours of course work and additional course work is required for students who don't have college level courses in calculus and matrix algebra and solid preparation at the Master's level in biostatistics. The minimum preparatory course requirements are a) 1 1/2 years of University level calculus, i.e. through multivariable calculus, b) completed an introductory course or its equivalent in matrix algebra, including matrix operations and solutions of matrix equations, c) completed a year of

mathematical statistics, d) have mastered the knowledge and skills in basic courses in biostatistics and epidemiology.

8. Library Resources to Support Doctor of Philosophy Degree Program

Overview

The University Libraries are the largest in the state (over 4.1 million volumes), and serve as a net leader for interlibrary loans. The University Libraries are also a regional depository for the U.S. Superintendent of Documents and U.S. Government Printing Office. UGA libraries is a member of the prestigious Association of Research Libraries, a nonprofit organization of 122 of the largest research libraries in the United States and Canada. In 2004, the University Libraries ranked 31st in total number of volumes held and 21st in total number of current serials owned.

Resources (print materials)

The University of Georgia library system has excellent print and electronic service resources, particularly in agriculture, basic life sciences, and medicine. Despite its current lack of an affiliated medical school, the University of Georgia ranked exceptionally high in a recent survey of materials held in the medical sciences. This favorably high status can be attributed to the University's long-standing commitment to teaching and research in the life sciences, pharmacy, nursing, and veterinary medicine. This commitment is being reinforced as the Georgia Health Sciences University (GHSU) and the University of Georgia (UGA) will matriculate an estimated 40 medical students on the Athens, GA campus in 2010 as the beginning of the GHSU/UGA Medical Partnership, which has received confirmation from the Liaison Committee on Medical Education (LCME).

Resources (electronic)

The University of Georgia's library system is a national leader in offering electronic access to a wide range of electronic resources, including journal articles in full text. Through the Southeastern Research Libraries Consortium, the University subscribes to the Institute for Scientific Information's (ISI) Web of Knowledge, whereby UGA students can access several searchable database products (e.g., Science Citation Index, Social Science Citation Index, Journal Citation Index, and Arts and Humanities Citation Index) that include citations back to 1945. In addition, the library provides access to the Current Index to Statistics (CIS) query engine, providing cutting edge electronic references to leading journals in biostatistical research. The statewide GALILEO system

provides access to hundreds of databases, including: CABI, Agricola, BIOSI, Biological and Agricultural Index, MEDLINE, PsychInfo, Sport DISCO, Chemical Abstracts SciFinder Scholar and Cambridge Scientific Abstracts, which taps more specialized databases such as Animal Behavior, Bioengineering, Calcium and Calcified Tissue, Entomology, Genetics, Human Genome, Immunology, Microbiology, Neuroscience, Nucleic Acids, Oncogenes and Growth Factors, Pollution, Risk Toxicology, and TOXLINE. The Libraries also subscribe to most of the JSTOR backfiles that provide online access to scanned journals back to their first volumes.

Online access to full text journals and serials is provided by in-house subscriptions (e.g., Elsevier's Science Direct) and through a consortium of libraries, including Emory, Georgia Tech, Georgia State, and the Georgia Health Sciences University. In addition to almost 1,000 Elsevier titles, the University Libraries currently subscribe to most titles published by Academic Press, BioOne, Marcel Dekker, Springer Verlag, John Wiley, Kluwer, Blackwell Science, Lippincott/Williams & Wilkins and Cell Press. Electronic access to full text serials and reference sources includes all titles published by Annual Reviews, Inc. The Libraries also subscribe to hundreds of other titles through Lexis/Nexis, EBSCO, and Periodicals Abstracts. As of 2009, electronic access to more than 18,000 full-text journals and 400,000 full-text e-books were available. Also, 7,000 print journals and 6.5 million microform units are available. In 2008, the library provided 2.15 million full text journal articles to UGA faculty and students, according to the 2008/2009 annual report.

Other full text electronic resources available on GALILEO include: AHFS Drug Information, CRC Handbook of Chemistry and Physics, DSM IV-TR, Encyclopedia of Human Nutrition, Encyclopedia of Food Microbiology, Encyclopedia of Immunology, Encyclopedia of Virology, The Prokaryotes, Stedman's Medical Dictionary, and USP/DI Drug Information.

The UGA Science Library has approximately 750,000 volumes and is open to the public. Library hours vary by department; the reference desk is staffed with a professional librarian or paraprofessional and the libraries are open approximately 16 hours per day.

Human Resources

Lucy M. Rowland, M.S., M.L.S., is the Head of the Science Collections and Research Facilities at UGA, as well as the Head of the Library at the College of Veterinary Medicine. She holds a B.S. in zoology (chemistry minor), a M.S. in microbiology, and a master of library science. In addition to postgraduate coursework in medical microbiology, she has been a diagnostic and research microbiologist in field and clinical settings. The author or co-author of numerous articles, she has over 25 years experience as a medical and life sciences librarian. Ms. Rowland is the Libraries' faculty liaison to the College of Veterinary Medicine and has been a faculty member in the College since 1980.

The Science Library provides reference assistance, interlibrary loan, and circulation services. The reference staff has six to eight full or part-time professional librarians and

three paraprofessionals. A limited number of study carrels for graduate students who are actively writing a thesis or dissertation are available at the Science Library through the Circulation Department.

9. Facilities

9.1. Office and Workspace

Coverdell Center for Biomedical and Health Sciences

The Department of Epidemiology and Biostatistics is located in the Coverdell Center for Biomedical and Health Sciences, Brooks Avenue, Athens, GA, 30602. The five biostatistics faculty in the Department of Epidemiology and Biostatistics occupy five private offices. Each office is furnished with a desk, chair, bookshelf, and file cabinet. The Department personnel, students and fellows also occupy desk space in common areas adjacent to faculty offices. These workspaces (cubicles) can accommodate five staff and students. The Department administration is located adjacent to the Department Head and is shared space with other departments in the College of Public Health.

Future Site of the Department of Epidemiology and Biostatistics – the Naval Supply School

Currently, the space in the Department is limited and more office and workspace will be needed to accommodate the growth of the Ph.D. program. As part of the University's master plan to develop the U.S. Navy Supply School into a Health Sciences campus, the Department of Epidemiology and Biostatistics will move to the Miller Building located at the Navy Supply School. This is a two-story building that will accommodate all current faculty, provide space for students, fellows, and research assistants. It will also include a computer laboratory, classrooms and a lecture room. The current plans are to move into this building by fall 2012

9.2. Equipment

The department of Epidemiology and Biostatistics is part of the College of Public Health. The College of Public Health has its own Information Technology department consisting of a Systems Administrator and a full time support technician, dedicated to serving the computing needs of CPH faculty, students and staff. Students have access to several college-wide computing laboratories, which provide a full range of statistical and modeling software to support classroom and independent research activities. The college has three computer labs, one in the Environmental Health Science building with 12 computers, one in the Coverdell Building with 11 computers and a projector for use as a teaching lab, and one mobile Macintosh lab consisting of 20 MacBooks on a mobile cart for use in instruction (although other uses will be considered by request). Additional student computer labs are located elsewhere on campus where CPH students' classes are held (e.g., Ramsey Center, Aderhold, Student Learning Center). A wide array of software

is available, including statistical packages, analytical programs and word processing packages. Software in CPH student labs includes MPNCalc, ArcGIS, SigmaPlot, SAS, and SPSS, Matlab, MiniTab, STATA, R, JMP, EpInfo, EpiData, Acslx Lite as well as standard programs such as Acrobat Pro, EndNote, Microsoft Office, Firefox, SSH and FTP programs and a variety of media software. Each graduate student is given storage space on the College Server that may be accessed from any college computer. The College receives a portion of Student Technology Fee funding each year, which serves to support technology services for students enrolled in College degree programs.

To support graduate student research, faculty and students working with them have access to the University-wide computing resources called the Research Computing Center (RCC). Several faculty members of the department are members of UGA's Bioinformatics Institute, who have priority to use a Linux cluster which include 20 dual-processor single-core nodes, AMD Opteron, 2GB RAM/core and 28 dual-processor quad-core nodes, Intel Xeon, 2GB RAM/core (IOB). Presently, the existing UGA Bioinformatics Core consists of a SGI Altix with 16 processors, an IBM p655 with 32, 8-CPU nodes (256 CPU cores) and a Linux cluster with 187 nodes (310 CPU cores). The cluster uses Platform LSF queuing system software. The joint computing power can be estimated to be around 5 Tflops.

We do not expect to have IT needs for the Ph.D. Biostatistics program beyond what is currently funded in our department and college.

10. Administration

The Ph.D. in Biostatistics will be a terminal degree. It will be administered using the current organizational structures of the Department. The Department of Epidemiology and Biostatistics is one of four departments in the College of Public Health. It is directed by a Head, who is responsible for promoting the teaching and research, and for administrating in the department. The department has three committees that are relevant to the administration of the Ph.D. in Biostatistics; these are the Admissions, Curriculum, and Exam committees. Each committee is comprised of three faculty appointed by the department head. As the name implies, the Biostatistics Admissions committee is responsible for admissions of new students to the Ph.D. program, including review of all applicants, selection of applicants to be admitted to the program, and offers of graduate assistantships to incoming students. The Admissions committee is chaired by the Graduate Coordinator, who is responsible for all communications with the Graduate School, and for monitoring students' progress towards completing their degrees. These communications will include but not be limited to announcements about advancement to candidacy, the defense of dissertation prospectus, and final defense. The Biostatistics Curriculum Committee is responsible for the administration of the Ph.D. program, including specification of degree requirements, approval of new courses, course change proposals, curricular changes, continuing education, and academic policies. The chair of the Curriculum Committee is responsible for all communications with the Curriculum Committee of the College of Public Health. The Biostatistics Exam Committee is

responsible for construction of the written comprehensive exam, which must be passed before candidates are admitted to candidacy for the Ph.D. in Biostatistics. In the case of a student dismissal or probation, the Graduate Coordinator will also work with the Curriculum and Academic Affairs Committee of the College of Public Health according to guidelines established by the University and Graduate School.

11. Program Assessment

11.1 Student Assessment

The quality of the Ph.D. program is reflected by student performance. Milestones towards completion of the degree include 1) completion of required and elective courses, 2) passing the written and oral comprehensive examinations, 3) defense of the prospectus, and 4) doctoral dissertation defense. Before students have formed their advisory committees, the students' progress towards the degree will be monitored by the Biostatistics Graduate Coordinator. After the advisory committee has formed, the students' academic advisors will be responsible for monitoring progress, and reported their progress to the Graduate Coordinator. Completion of required courses will require a B average or better with no single required course grade below B-. The advisory committees will determine whether or not students have passed their oral comprehensive examination, the defense of the prospectus, and the doctoral dissertation defense. The academic advisor will provide feedback to students about their performance in the program. If a student fails to make satisfactory progress, the advisory committee will review the case and make recommendations regarding remedial study or dismissal from the program in coordination with the Graduate Coordinator. All requirements for candidacy, comprehensive examinations, preparation of dissertation, and defense of the dissertation will be in accordance with existing Graduate School policies. The department will track the degree completion rate and the times it takes to complete the degree among all students admitted to the Ph.D. program.

Students will demonstrate that they have achieved the program competencies as follows:

> 1. *Demonstrate a command of core biostatistical techniques, including their computation, theoretical underpinnings, and their application in public health and biomedicine.*
>
> Students are exposed to core biostatistical techniques in the BIOS 8010-8040 course sequence. In these courses, students will not only be exposed to computation methods, but also the statistical theory that underlies those methods. Students are also expected to be able to identify appropriate methods of statistical analysis for application to public health and biomedical data. This competency will be evaluated in the written and oral comprehensive examinations.

2. *Work independently as a collaborator with public health and biomedical researchers to design clinical trials, case-control studies, public health surveys, and other experimental and observational studies.*

The design of public health surveys, biomedical experiments and clinical trials will also be considered in the BIOS 8010-8040 course sequence. Students will demonstrate their design skills in Bios 8200 Biostatistical Consulting.

3. *Conduct and publish original research on the theory and application of biostatistics aimed at developing new and innovative methods for analysis of public health and biomedical data.*

The theoretical core course sequences STAT 6810-6820, and BIOS 8310-8320 will provide students the necessary theoretical background to develop new and innovative biostatistical methods and demonstrate their efficacy. Students will demonstrate their competency in statistical theory in the written and oral comprehensive examinations. Their ability to develop new and innovative methods will be demonstrated in their dissertation. A dissertation is deemed satisfactory if, in the opinion of the student's advisory committee, the material is of publishable quality.

4. *Communicate effectively with investigators in public health and biomedical research.*

Students taking BIOS 8200 Biostatistical Consulting will be assigned consulting projects with public health and biomedical researchers. To achieve a passing grade in this course, they expected to communicate effectively in their written and oral project reports.

5. *Teach biostatistics to undergraduate students in public health, biomedicine, and related fields.*

Students are expected to complete 1 semester of teaching practicum before completing their degree.

6. *Demonstrate and practice ethical research as it pertains to data management, analysis, and interpretation.*

The ethical practice of biostatistics is considered in BIOS 8200 Biostatistical Consulting. Students are expected to engage in ethical practice in their consulting programs, and the engage in ethical research in their dissertations.

7. *Critically review the statistical literature, and the statistical content of the public health and biomedical literature.*

A critical review of the biostatistical literature in the student's research area is expected in their prospectus, and in their dissertation.

11.2 Program Assessment

The quality of the Ph.D. Biostatistics program will be assessed on a continual basis by faculty, students and alumni, the College, and accrediting bodies.

Faculty Assessments

The faculty in the Department of Epidemiology and Biostatistics will be the group with the most direct and frequent evaluation of the program. The faculty will review performance measures relating to student admission, performance once in the program, quality and appropriateness of the curriculum offered. The chair of the Biostatistics Admissions Committee will monitor and report to the faculty about the number of applicants per year, the number (percent) accepted, the quality of accepted candidates as measured by the grade point average (GPA) and other standardized test scores. Student assessment will be performed by the academic advisors as described in Section 11.1 Student Assessments. The Biostatistics Curriculum Committee will review the course offerings on an annual basis to be sure that they meet the changing needs for knowledge and information in the field.

In an effort to develop and maintain the highest standards of instruction, the Department of Epidemiology and Biostatistics conducts peer-reviewed teaching evaluations each year. At least once a year, a colleague within the department (or college) attends one class of another faculty member and evaluates the content, style, and effectiveness of teaching. These standardized and written reports are included as part of the annual review of faculty. The department head can make recommendations about any deficiency in teaching.

In terms of outcomes, the program will enumerate the number of graduates per year and cumulatively. One way to evaluate the quality of a program is to determine positions obtained after graduation. To this end, we will maintain a database of Ph.D. graduates from our program that includes date and year of graduation, dissertation topic, position(s) obtained during the first 10 years after graduation, and any awards or prizes. Another aspect of evaluation will include scientific contributions to the field of Biostatistics. During a student's training, we will track the number of scientific manuscripts, presentations at local, national and international meetings. After graduation, we will track scientific contributions through publications with annual web databases searches (e.g., using Web of Science, PubMed).

Student and Alumni Assessments

Student assessments will form a critical part of the evaluation of the overall program. Student assessments will comprise two different evaluations. After each course, students

are required to complete and submit anonymously course evaluations. These course evaluations are collated and submitted to the faculty member(s), departmental chair, and the administrative office of the College. At annual performance reviews, the head of department reviews the student evaluations with the faculty members and provides feedback for improving teaching performance the next year. In addition, faculty may use the open ended responses by students to gauge their performance and identify areas for improvement. Students will also be given the opportunity to assess the program upon graduation to determine whether the learning objectives of the program have been met. These exit surveys will identify perceived strengths and weaknesses of the faculty, courses, research opportunities, mentoring, teaching, and career advice and direction.

Often the full breadth and depth of an education cannot be fully appreciated until after students enter the workforce when they can evaluate how well their education in the department prepared them. To this end, a survey will be sent to recent graduates (within one year of graduation) and to alumni after three years. The survey of recent graduates will focus on the transition from student to professional life and how well the program prepared the student. The three-year survey will assess whether the program provided the necessary skills to be successful in the workforce. The results of these surveys will be collated and reported to the department head and faculty.

Department of Epidemiology and Biostatistics Assessments

The faculty credentials will be evaluated annually by the department Head using criteria set forth by the Council on Education in Public Health. These evaluations include assessment of teaching, research, and service.

External Assessments

Program review of all academic departments occurs every seven years. As per university policy, external review teams comprised of eminent biostatisticians and epidemiologists will critically review the Ph.D. program, and make recommendations for improvement. As a department in the College of Public Health, the Ph.D. program will also be reviewed during reaccreditation.

12. Accreditation

The Council on Education for Public Health (CEPH) is the only independent agency recognized by the U.S. Department of Education to accredit schools of public health and certain public health programs offered in settings other than schools of public health. Accreditation by CEPH reflects achievement of academic program excellence, and it is required in order to be fully recognized as a member of the Association of Schools of Public Health (ASPH). In June 2009, the College of Public Health was fully accredited by the Council on Education for Public Health and now becomes the 41st accredited college of public health in the country and the only accredited college of public health within the University System of Georgia.

Although the Ph.D. in Biostatistics was not part of the initial accreditation process, the doctoral degree will be included during the next accreditation of the College in 5 years. The CEPH accreditation criteria focus specifically on the MPH degree education with no specific guidelines for doctoral degrees. The sole reference by CEPH to doctoral education is that an accredited school of public health must offer at least three doctoral degree programs that relate to public health. In this regard, the Ph.D. Biostatistics will add a fourth doctorate degree to be offered by the College. In addition, CEPH stipulates that at least five full-time faculty with proper training must be within a department offering a doctoral degree. The current application also meets that requirement.

Apart from CEPH, there is no formal body that accredits Ph.D. programs in Biostatistics. The Department includes, however, faculty who are members of national scientific organizations in Biostatistics that determine the direction of the field. Thus, the faculty is in touch with the training and educational requirements to keep current in Biostatistics.

13. Affirmative Action Impact

Healthy People 2010 underscores the importance of focusing significant public health efforts to improve the health and quality of life of underserved populations. Currently, UGA's College of Public Health possesses affiliations with state-wide infrastructures that will allow it to focus on minority health care issues and minority professionals.

A large portion of recruitment efforts will focus on enrolling minority students (e.g., African-Americans, Hispanics, Asians, and Native Americans) and will stress the significant role they have the potential to play as future public health leaders. Faculty and enrolled student representatives will visit targeted campuses in the Southeast in an effort to recruit students from minority gender and race groups. In addition, promotional brochures will be mailed to southeastern schools with substantial minority student populations. Such schools might include: Schools in the Atlanta University Center, Georgia State, Armstrong Atlantic State, Fort Valley, Mercer University, University of Alabama, University of South Carolina, University of North Carolina, and Tulane University. Promotional materials will also be sent to regional public health agencies, such as the Centers for Disease Control and Prevention, Georgia Department of Human Resources, Georgia's state and regional district public health offices, and non-profit agencies (e.g., American Cancer Society). Finally, UGA representatives will use carefully tailored recruitment messages to actively promote its doctoral degree programs at relevant conferences and conventions. In particular, promotional efforts will target the American Public Health Association's national convention and significant minority health-focused state/regional conventions.

14. Degree Inscription

Doctor of Philosophy in Biostatistics

15. Fiscal and Enrollment Impact and Estimated Budget

Enrollment Projections

According to the student survey (Section 3.4), there will likely be demand for the Ph.D. in Biostatistics. The number of students in the program at any one time will depend on the size of the primary faculty in the department and funding resources available to support students. The department currently supports two graduate teaching assistants for its undergraduate course. We project that each senior faculty member can support two doctoral students at any one time; junior faculty may support fewer, depending on experience and funding. Given the current mix of senior and junior faculty, the Department would be able to provide academic and educational support for 9-10 doctoral students at this time. Because the program is new, we plan to phase in the number of students over the first three years starting with two in the first year.

Doctoral Student Support

Doctoral students in the department will be supported through teaching assistantships, research grants and training grants. Currently, 2 teaching assistants are required to support computing labs for the BIOS 2010 course. We are currently developing an undergraduate course in biostatistics for ecology, and in collaboration with the Bioinformatics Institute, we are developing an additional cross-disciplinary undergraduate course to be taught be faculty in Biostatistics, Bioinformatics and Computer Science. This course will generate funding for additional graduate teaching assistantships.

At the current time, seven students are being supported by the biostatistics unit within the Department of Epidemiology and Biostatistics. Two MPH students are teaching assistants for our undergraduate biostatistics course. Rathbun supports two students from his federal grants, one NSF and one NIH as well as a third student using funds from a subcontract on Dan Colley's Gates Foundation grant supporting Schistosomiasis research. Dobbin is supporting a student using cancer coalition funding, and Monica Gaughan from the Department of Health Policy and Management is supporting one MPH biostatistics student. Growth in funding should be sufficient to cover the planned growth in the number of students.

Although scholarships may become available in the future, no departmental or College resources are available to support study tuition at this time. As the federal, state and private grant portfolio grows in the department, a stable base of tuition and stipend support will be developed. Furthermore, when there is a critical mass of federally funded research programs in the department, we will submit an institutional training grant (T32 at NIH) to support pre-doctoral students. Funding for additional students will come from the Biostatistics Collaborative Unit, whose mission is to develop joint grant proposals with faculty from the College of Public Health, the Georgia Health Sciences University/ University of Georgia Medical Partnership, Institute of Bioinformatics, Institute for

Behavioral Research, and the Biomedical Health Sciences Institute. The department currently supports stipends for 15 students, 4 doctoral (Dr.P.H.) and 11 MPH students.

In general, faculty members with active research programs will be the major professors for our doctoral students. These faculty members will support students through the federally funded research grants, if permitted, or through formal training grants awarded to the college. The number of students that can be accepted each year will be determined, in part, by the funding base available to the faculty members.

Budgetary Considerations

The proposed program does not require any new faculty to meet its educational or research needs. With the primary and adjunct faculty, there is a wide array expertise to teach the current and new courses. Note that students are expected to take five years to complete their PhD, so no students are expected to receive PhDs within the first three years of the program.

I. ENROLLMENT PROJECTIONS			FY 2012	FY 2013	FY 2014
A.	Student Majors				
	1.	Shifted from other programs	0	0	0
	2.	New to institution	2	3	4
	3.	Total New Students Enrolled in program (per year)	2	3	4
Total Majors			2	5	9
B.	Course sections satisfying program requirements				
1.		Previously existing	6	8	14
2.		New	2	6	2
Total Program Course Sections			8	14	16
C. Estimated Credit Hours generated by those courses					
1.		Existing enrollments (students X credit hours X courses)	111	111	111
2.		New Enrollments (students X credit hours X courses)	48	120	216
Total Credit Hours			159	231	327

		EFT	Dollars	EFT	Dollars	EFT	Dollars
D.	Degrees awarded	0		0		0	

II. Costs		EFT	Dollars	EFT	Dollars	EFT	Dollars
A.	Personnel reassigned or existing positions						
	1. Faculty						
	2. Part-time Faculty						
	3. Grad. Assistants						
	4. Administrators						
	5. Support Staff						
	6. Fringe Benefits (26%)						
	7. Other personnel costs						
Total Existing Personnel Costs[1]		0	0	0	0	0	0
B.	Personnel new positions						
	1. Faculty						
	2. Part-time Faculty						
	3. Grad. Assistants[2] (Presuming maximum of 49.999%)	2 x .49999%	$34,544.00	5 x .49999%	$86,361.00	9 x .49999%	$155,450.00
	4. Administrators						
	5. Support Staff						
	6. Fringe Benefits (5% for grad. assistants)	2 x .49999%	$1,725.00	5 x .49999%	$4,312.00	9 x .49999%	$7,762.00
	7. Other personnel costs						
Total New Personnel Costs		2	$36,269.00	8	$90,673.00	10	$163,212.00

C.	Start-up Costs (one-time expenses)	1st Year	2nd Year	3rd Year

	1.	Library/learning resources			
	2.	Equipment			
	3.	Other (_____)			
D.	Physical Facilities: construction or major renovation				
		Total One - Time Costs	0	0	0

E.	Operating Costs (recurring costs - base budget)				
	1.	Supplies/Expenses	$600	$650	$700
	2.	Travel			
	3.	Equipment (classroom technologies)	$1200	$1200	$1200
	4.	Library/learning resources			
	5.	Other			
Total Recurring Costs			$1800	$1850	$1900
Grand Total Costs			$38,069	$92,523	$165112
III. Revenue Sources					
A.	Source of Fund				
	1.	Reallocation of existing funds			
	2.	New student workload	2	5	9
	3.	New tuition (Includes full and part-time) (presuming 12 hours per term, Fall and Spring using Spring 2010 rates from University Bursar)	$13,226.00	$33,065.00	$59,517.00
	4.	Federal funds[2]	$36,269.00	$90,673.00	$163,212.00
	5.	Other grants			
	6.	Student fees ($1000/student)	$2,000.00	$5,000.00	$9,000.00
	7.	Other (_____)			
		Subtotal	$51,495.00	$128,738.00	$231,729.00

New State Allocation Requested			
Grand Total Revenues	$51,495.00	$128,738.00	$231,729.00
B. Nature of funds			
1. Base budget			
2. One-time funds			
GRAND TOTAL REVENUES	$51,495.00	$128,738.00	$231,729.00

NOTES
[1]No impact is anticipated regarding existing personnel costs to implement this degree program. Current faculty and staff are sufficient to support the degree program without adversely affecting other instruction, research or public service.
[2]The Department of Epidemiology & Biostatistics anticipates offering all PhD students graduate research assistantships through extramural grant funds. State funds are not anticipated to support any PhD students.

16. References

Allen, C.R. (2005). Bioscience industry in Atlanta. *Drug Discovery Today* 10, 237-239.

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Ernst & Young (2004). *Resurgence: Global Biotechnology Report 2004 – The America's Perspective*, p. 20, Ernst & Young.

Winslow, C.E.A. (1920). The untilled fields of public health. *Science* 51, 23-33.

Letter from External Review

Thomas Louis, Professor of Biostatistics, Department of Biostatistics, Johns Hopkins University.

Subject: FW: Proposed PhD and MSc
From: Kevin K Dobbin <dobbinke@uga.edu>
Date: Mon, 6 Sep 2010 15:13:30 +0000
To: Stephen LYNN RATHBUN <rathbun@uga.edu>

Hi Steve,

Here are the comments from Tom.

Hope you are having a nice Labor Day weekend,
-Kevin

From: Louis, Thomas A. [tlouis@jhsph.edu]
Sent: Monday, September 06, 2010 9:30 AM
To: Kevin K Dobbin
Subject: Proposed PhD and MSc

Kevin,

I've made a few comments and suggestions on the attached PhD proposal. Many also apply to the MSc proposal.
Generally, they look like good ways to start and evlove.

Regards,

Tom

Biostatistics PhD proposal for review-TALcmts.doc	Content-Description:	Biostatistics PhD proposal for review-TALcmts.doc
	Content-Type:	application/msword
	Content-Encoding:	base64

The University of Georgia

Department of Statistics

November 17, 2010

Professor Stephen L. Rathbun
Department of Epidemiology and Biostatistics
University of Georgia
Athens, GA 30602

Dear Steve:

The effort and thought that has gone into your proposals for MS and PhD degree programs in Biostatistics is very impressive. I write in strong support of the development of these programs. These are programs that are critical for the continued development of your department and college, and that will be of great value to the university. Strong Biostatistics programs are also essential for the development of a research arm in the newly established MCG/UGA Medical Partnership.

In establishing these programs it is inevitable that there will be some overlap in topics that you offer in your courses and that the Statistics department offers in its courses. I fully subscribe to the statement in your PhD proposal about the respective roles for our units:

> *The Department of Statistics will provide our students the necessary theoretical foundations to conduct biostatistical research, while the Department of Epidemiology and Biostatistics will educate Statistics and Biostatistics students in the use of state-of-the-art biostatistical methods aimed at applications in public health and biomedicine.*

I am confident that we will continue to collaborate along the lines suggested by this quote and that this will benefit both departments.

Thus, I strongly and enthusiastically support the creation of MS and PhD programs in Biostatistics and applaud you for the proposals that you have developed for these programs.

Sincerely yours,

John Stufken, Professor and Head
Department of Statistics

204 Statistics Building • Athens, Georgia 30602-1952 • Telephone (706) 542-5232
Fax (706) 542-3391 • electronic address: dept@stat.uga.edu
An Equal Opportunity/Affirmative Action Institution

February 1, 2012

University Council Curriculum Committee
University of Georgia
Athens, GA 30602

Dear Colleagues,

The introduction of M.S. and Ph.D. programs in biostatistics has been a goal of the College of Public Health since its inception in 2005. It was quickly recognized that the success of these programs depends on graduate student funding and that state funds may be limited to 2-3 students in support of undergraduate teaching. To facilitate the implementation of our graduate degree programs, we have sought to support as many students as possible, whether they are Masters of Public Health students or statistics graduate students. At the current time, we are currently supporting 11 students, 8 from grants, as detailed in the table below. The amount of student support is more than sufficient to support the first two years of our proposed graduate programs without any additional state support. Further growth will be required to support students in future years, but given the rate at which grant support is increasing within our department, we are confident that this growth can be achieved.

Name	Home Department	Degree Sought	Source of Funding
Jeannie Daniel	Epidemiology and Biostatistics	MPH	College of Public Health
Tara Dasigi	Epidemiology and Biostatistics	MPH	College of Public Health
Dongjing Guo	Epidemiology and Biostatistics	MPH	Dept. Epidemiology and Biostatistics
Nat Kulvanich	Statistics	PhD	NIH (Rathbun)
Shiyao Wang	Statistics	PhD	NIH (Rathbun)
Stephanie Cooke	Bioinformatics	PhD	Georgia Cancer Coalition (Dobbin)
Alexi Ionan	Statistics	PhD	Georgia Cancer Coalition (Dobbin)
Sandra Addo	Statistics	PhD	NIH (Dobbin)
Jung Ae Lee	Statistics	PhD	NIH (Dobbin)
Yuhang Xu	Statistics	PhD	NIH (Song)
Hsien-Lin Hsieh	Statistics	PhD	CDC (Orpinas, Health Promotion and Behavior)

Thank you for considering this information regarding student support.

Best Regards,

Stephen Rathbun
Professor of Biostatistics