STATE UNIVERSITY OF NEW YORK
AT BUFFALO

DEPARTMENT OF
BIOSTATISTICS

UNDERGRADUATE
STUDENT HANDBOOK

Updated January 19, 2018
About the Department

Biostatistics at the University at Buffalo
The Department of Biostatistics of the State University of New York at Buffalo was formed within the School of Public Health and Health Professions (SPHHP) in June 2003. The formation of the Department followed the opening of the SPHHP in January 2003. This new organization allowed for the development of graduate programs in biostatistics and for a more centralized coordination research activities of applied and theoretical instruction. The Department includes biostatisticians at the Roswell Park Cancer Institute, the Research Institute on Addictions, and the Women and Children's Health Research Foundation. These affiliations, in addition to collaborations with researchers in the Center of Excellence in Bioinformatics, the College of Dentistry, the College of Medicine and Biomedical Sciences, and the School of Public Health and Health Professions, provide a rich environment for the education and training of statisticians and biostatisticians. In addition to their classroom studies, the Department’s students have opportunities to gain practical training through mentored, hands-on data analyses in the context of important biological and health science research projects. It is a thriving environment and an exciting time for biostatistics at the University at Buffalo.

Mission of the Department
The mission of the Department of Biostatistics is to educate and train biostatistical scientists; to collaborate with researchers in the clinical and public health sciences; to conduct methodological research; to collaborate with local, state, or national health institutions; and to serve our University and the statistics and public health professions.

Teaching Philosophy
Our philosophy of education is that students learn what they apply. The Department seeks to provide opportunities for students to communicate their knowledge to others through classroom presentations and student seminars.

Faculty bring a philosophy to the classroom and to their mentoring that is consistent with the Department’s goals to promote and extend the proper use of statistics in the health sciences, to contribute substantively and methodologically to the advancement of knowledge in health related disciplines, and to aid the advance of evidenced-based medicine, healthcare, public health practice and policy making. This emphasis brings a high degree of relevance to the classroom and enhances students’ opportunities to work as apprentices with faculty. Faculty and students together work with collaborators in the School of Public Health and Health Professions, the School of Medicine and Biomedical Sciences, and at the Roswell Park Cancer Institute.

We believe in a holistic approach to education. The Department is dedicated to providing a wide variety of educational, research, and collaborative opportunities to students in a friendly, respectful, nurturing, and stimulating environment that promotes intellectual and professional development.
**Research Activities**
The Departmental faculty engages in theoretical, methodological, and applied statistical research. This work is often motivated by their collaborations with health science researchers. There is ongoing involvement in medical informatics and bioinformatics, cancer research, maternal and child health, research on addictions, and epidemiology. Projects span a wide range of topics such as biosurveillance, metabolomics, microarray data analysis, pattern recognition and classification, proteomics, statistical genetics, clinical trials to assess the efficacy of cancer treatments, epidemiologic studies of environmental risk factors, and outcomes research.

**Contact Information**
Department Phone Number: (716) 829-3690
Department Fax Number: (716) 829-2200
Email address: sphhp-biostat@buffalo.edu

**Personnel: Faculty**

**Chair and Professor**
Gregory E. Wilding, PhD
University of Rochester
Research interests: clinical trial design, permutation tests, resampling techniques, goodness-of-fit tests, distributional characterizations, copulas, tests of independence, biostatistics.

**Graduate Director, Associate Chair and Professor**
Lili Tian, PhD
University of Rochester
Research interests: goodness-of-fit testing; skewed data analysis; order-restricted inference; inverse Gaussian models; design of clinical trials; longitudinal data analysis; survival analysis; analysis of medical expenditure data; generalized variable approach; statistical genetics; cancer research; behavioral studies; health policy studies.

**Professor**
Marianthi Markatou, PhD
Pennsylvania State University
Statistical Sciences (Statistics and Biostatistics): Problems in model assessment and selection, robustness, mixture models, statistical distances, biomarker development and ROC analysis, high dimensional data analysis, large databases data analysis, surveillance in large databases, methods for the analysis of observational data. Interdisciplinary: Machine learning and data mining, text data mining, biomedical informatics, emerging safety sciences relevant to health, study of dependence in microarrays and proteomics data, comparative safety and comparative effectiveness research.
Albert Vexler, PhD  
Hebrew University of Jerusalem, Israel

Research interests: receiver operating characteristic curves analysis; measurement error; optimal designs; regression models; censored data; change point problems; sequential analysis; statistical epidemiology; biostatistics; applications of Bayesian approaches to tests; asymptomatic methods of statistics; forecasting; sampling; optimal testing; nonparametric tests; empirical likelihoods; renewal theory; tauberian theorems; time series; categorical analysis; multivariate analysis; multivariate testing of complex hypotheses; factor and principal component analysis

**Undergraduate Director**  
**Research Professor**  
Dietrich Kuhlmann, PhD  
University of Missouri

**Research Professor**  
David Tritchler, PhD  
University of Toronto
Statistical Analysis of DNA microarrays, statistical genomics, design & analysis of genetic studies, graphical models, casual inference, Bayesian networks, meta-analysis, statistical computation.

**Associate Professors**

Changxing Ma, PhD  
Nankai University
MPH Concentration Co-Director
Statistical genetics and experimental design

Jeffrey Miecznikowski, PhD  
Carnegie Mellon University
MS Program Co-Director

Research interests: bio-technical image analysis, array comparative genomic hybridization (aCGH) analysis, microarray analysis, nonparametric statistics, bootstrap methods, and software development

Jihnhee Yu, PhD  
Texas A & M University
Director, Public Health Observatory
Research interests: stochastic processes and small clinical trials

**Assistant Professors**

Rachael Hageman-Blair, PhD  
Case Western University
Research interests: mathematical biology, optimization, numerical analysis, inverse problems, statistics and scientific computing, methodology development for mathematical modeling and simulation of metabolic and genetic networks, data analysis including microarray and quantitative trait loci.
Jiwei Zhao, PhD

Univer

University of Wisconsin-Madison

Statistical methodology including semiparametric modeling and methods; non-regular likelihood methods (including pseudo, penalized, conditional, empirical, etc.); missing data analysis (especially non-ignorable missing data) in longitudinal data and observational studies; case-control studies; high-dimensional data analysis and variable selection. Zhao also has research interests in a number of subject-matter applications and collaborations, including epidemiology; cancer women’s health environmental health; mental illness; and substance abuse.

Research Assistant Professors

Kristopher Attwood, PhD
Research interests: Clinical, observational and diagnostic studies, decision theory, research operations, and statistics education.

University at Buffalo

William Brady, PhD
Research interests: statistical methods research focuses primarily on phase I and II clinical trial design and the application of exact methods to binary data.

University at Buffalo

Kevin Hasegawa Eng, PhD
Research interests: Translational genomics in ovarian cancer; Biomarker development and validation; and statistical genomics algorithms for personalized medicine.

University of Wisconsin-Madison

Virginia Filiaci, PhD
Gynecological Oncology Group, Roswell Park Cancer Institute

Terry Mashtare, Jr., PhD

University at Buffalo

Jianmin Wang, PhD
Roswell Park Cancer Institute

Iowa State University

Austin Miller, PhD
Research interests: The design and analysis of experimental, clinical and observational studies, measurement error models and structural equations modeling

University at Buffalo

Jianmin Wang, PhD
Roswell Park Cancer Institute

Iowa State University

Lei Wei, PhD
Roswell Park Cancer Institute

University at Buffalo

Qianqian Zhu, PhD
Roswell Park Cancer Institute

University at Buffalo
**Professors Emeriti**

M.M. Desu, PhD  
University of Minnesota  
Nonparametric statistical methods and sample size methodology

Randy Carter, PhD  
Iowa State University  
Research interests: measurement error models, structural equation models, longitudinal data methods, risk assessment, biostatistics, radiation effects, epidemiological modeling, maternal and child health epidemiology

**Adjunct Professor**

Joseph Consiglio, PhD  
University at Buffalo

**Adjunct Research Professor**

Calyampudi Radhakrishna Rao, PhD  
Purdue University

**Adjunct Associate Professor**

Joseph Lucke, PhD  
University of Kansas  
Research Institute on Addictions, Buffalo, NY

**Adjunct Assistant Professor**

Pinaki Sarder, PhD

Li Yan, PhD  
University of Rochester PhD in Physics and University at Buffalo PhD in Biostatistics

**Personnel: Staff**

Amy Barczykowski  
Data Manager, Population Health Observatory

Beth Ann Crvelin  
Assistant to the Chair

Noreen D. McGuire  
Graduate Program Coordinator

Teresa Sikorski  
Department Secretary
BA Statistics

From assessing public opinions through surveys to forecasting business trends to evaluating the effectiveness of medical treatments, there is and will continue to be a demand for individuals who can provide a statistical skill set.

With a bachelor's degree, you will:

- Gain a solid knowledge base in various aspects of statistical theory, methods and applications.
- Advance to graduate or professional study.
- Prepare for success across countless industries, the government and academia.

Requirements and Curriculum

This major requires a minimum of 51 credit hours of coursework. Additional credit hours are required for the bachelor's degree.

<table>
<thead>
<tr>
<th>Credits Required for Major</th>
<th>51</th>
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<tbody>
<tr>
<td>Additional Credits Required for UB Curriculum</td>
<td>33</td>
</tr>
<tr>
<td>Additional Credits Required for Electives</td>
<td>36</td>
</tr>
<tr>
<td>Total Credits Required for Degree</td>
<td>120</td>
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</tbody>
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Core Required Courses

- STA 119 Statistical Methods
- STA 301 Introduction to Probability
- STA 302 Introduction to Stat. Inference
- STA 403 Regression Analysis
- STA 404 Analysis of Variance

Elective Courses

At least three of the following:

- STA 309 Statistical Quality Control
- STA 406 Statistical Computing
- STA 411 Stochastic Processes
- STA 415 Distribution Free Inference
- STA 431 Methods of Survey Samples
- STA 461 Applied Time Series Analysis
One of the following can be substituted for an elective:

- MTH 311 Intro to Higher Mathematics
- Any CSE 300 – 400 level course

**Additional Required Courses**

Five courses from other departments (or their equivalents) are required. Students intending to pursue graduate work in statistics are strongly encouraged to take additional mathematics courses.

- PUB 101 Intro to Public Health
- MTH 141 College Calculus I
- MTH 142 College Calculus II
- MTH 241 College Calculus III
- MTH 309 Introductory Linear Algebra
- CSE 113 Intro to Computer Programming I

**Minor in Statistics**

Our department also offers a Minor in Statistics. Our program provides you with a calculus-based foundation in probability and statistics before progressing into numerous areas of application.

The minor requires seven courses for a total of 26 credits, and a minimum GPA of 2.5 in the first three prerequisite or lower-division courses. All University graduation requirements must be met as well.

**Lower-Division Courses**

These courses will introduce you to the statistical concepts developed in the upper-division courses.

- MTH 141 College Calculus I
- MTH 142 College Calculus II
- STA 119 Introduction to Statistical Methods

**Upper-Division Courses**

- STA 301 Introduction to Probability
- STA 302 Introduction to Statistical Inference
• STA 403 Regression Analysis
• STA 404 Analysis-of-Variance

Administrative Requirements
The Undergraduate Catalog (http://undergrad-catalog.buffalo.edu/) contains official information regarding university policies. Please consult it for information regarding, for example, University graduation requirements, course grade policies, academic dishonesty policy, registration, student records, Application for Degree Form.

Questions about program requirements or curriculum?
Contact undergraduate advisement at sphp-oasa@buffalo.edu or (716) 829-5000.

Course Descriptions
Unless otherwise specified, courses are 3 credit courses.

STA 119 Statistical Methods (4)
Covers topics in descriptive statistics, probability, inference, and experimental design, all of which are put together to draw conclusions from uncertainty through analysis of experimental data. Although a general statistical methods course, the material (through examples) is geared towards sciences majors, especially those in the health sciences. The underlying reasoning behind the techniques will be explored.

STA 301 Introduction to Probability (4)
Provides students with probability and distribution theory necessary for the study of statistics. Topics include axioms of probability theory, independence, conditional probability, random variables, discrete and continuous probability distributions, functions of random variables, moment generating functions, the Law of Large Numbers, and the Central Limit Theorem.

STA 302 Introduction to Statistical Inference (4)
Introduces principles of statistical inference. Introduces and develops classical methods of estimation, tests of significance, the Neyman-Pearson Theory of testing hypotheses, maximum likelihood methods, and Bayesian statistics.
STA 403 Regression Analysis (3)
Regression analysis and introduction to linear models. Topics: Multiple regression, analysis of covariance, least square means, logistic regression, and non-linear regression. This course includes a one hour computer lab and emphasizes hands-on applications to datasets from the health sciences.

STA 404 Analysis of Variance (3)
Advanced presentation of statistical methods for comparing populations and estimating and testing associations between variables. Topics include point estimation; confidence intervals; hypothesis testing; ANOVA models for 1, 2, and k way classifications; multiple comparisons; chi-square test of homogeneity; Fisher’s exact test; McNemar’s test; measures of association, including odds ratio, relative risks, Mantel-Haenszel tests of association, and standardized rates; repeated measures ANOVA; simple regression; and correlation.

STA 406 Statistical Computing (3)
The purpose of this course is to familiarize students with PC-based statistical computing applications for public health. This course will develop basic skills in the use of a statistical package through classroom demonstrations and independent lab assignments. The course will emphasize data definition, verification, descriptive and inferential statistics, and graphical presentation. The course should familiarize the students with the use of a statistical package and give them the skills needed for effective data management, data manipulation, and data analysis at a basic level. Pre-Requisite STA 119 or permission of instructor

STA 411 Stochastic Processes (3)

STA 415 Distribution Free Inference (3)

STA 431 Methods of Survey Samples (3)

STA 461 Applied Time Series Analysis (3)