STATE UNIVERSITY OF NEW YORK AT BUFFALO

DEPARTMENT OF BIOSTATISTICS

UNDERGRADUATE STUDENT HANDBOOK

Updated October 7, 2024

Undergraduate Programs:
BA Statistics
Minor in Statistics

Teaching Philosophy

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.

Department of Biostatistics
Interim Chair and Associate Professor

Douglas Landsittel, PhD	University of Pittsburgh

Undergraduate Faculty

Undergraduate Director
Research Professor

Dietrich Kuhlmann, PhD	University of Missouri

Research Assistant Professor

Joseph Consiglio, PhD	University at Buffalo
Jonathan Lopez, PhD	University of Rochester

Staff

Joanna McCarthy	Resource Manager
Noreen D. McGuire	Academic 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.

Credits Required for Major	51
Additional Credits Required for UB Curriculum	33
Additional Credits Required for Electives	36
Total Credits Required for Degree	120

Core Required Courses (18 credits)

- STA 119 Statistical Methods Lecture (3) and Recitation (1)*
- STA 301 Introduction to Probability Lecture (3) and Recitation (1)

- STA 302 Introduction to Stat. Inference Lecture (3) and Recitation (1)
- STA 403 Regression Analysis (3)
- STA 404 Design of Experiments (3)

Restricted Elective Courses (3-12 credits)

At least three of the following:

- STA 306 Statistical Computing w/SAS I
- STA 309 Statistical Quality Control
- STA 361 Statistical Programming in R (1)
- STA 411 Prob. & Stochastic Processes
- STA 415 Distribution Free Inference
- STA 431 Sample Surveys Theory-Methods
- STA 461 Applied Time Series Analysis
- STA 471 Topics in Statistics I (1-4 credits)
- STA 472 Topics in Statistics II (1-4 credits)

MTH 311 Intro to Higher Mathematics can be substituted for an elective

Additional Required Courses (23 credits)

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.

- CSE 115 Introduction to Computer Science I (4)
- MTH 141 College Calculus I (4)
- MTH 142 College Calculus II (4)
- MTH 241 College Calculus III (4)
- MTH 309 Introductory Linear Algebra (4)
- PUB 101 Intro to Public Health (3)

Total Credits Required for Major: 44-53

Additional Degree Requirements Include:

- Additional coursework to fulfill UB Curriculum requirements
- Elective courses as needed to complete the 120 credit hour total

Total Credits Required for Graduation: 120

Notes

- The department does require a GPA of 2.500 or higher in the following lower division courses to keep the status of statistics major: MTH 141LR, MTH 142LR and STA 119LEC/STA 119REC
- Students not attaining the 2.500 average will need to retake courses to improve their average or they will be removed from the program.
- Students intending to pursue graduate work in statistics are strongly encouraged to take additional mathematics courses.

Academic Requirements

- Minimum major GPA of 2.000 required for graduation.

All Statistics students will be academically reviewed at the end of each semester after grades are posted. Academic review standards are as follows:

- Minimum UB GPA of 2.000
- Minimum major GPA of 2.000

Students identified after academic review each semester who do not meet these requirements will be notified via their UB Email account. The first semester that students receive a warning notification they will be mandated to make an advising appointment before registering for next semester's classes (enforced with a hold). Second semester of not meeting criteria will mandate that the student attend an SPHHP sponsored workshop on academic improvement and mandate them to meet with an academic advisor (enforced with service indicator). When a student is identified with 3 semesters of

academic warning the student will be removed from the major. Academic reviews are conducted following Fall and Spring semesters only. Courses repeated during the winter and/or summer are not factored into the review.

Students who are academic dismissed from the Statistics BA major have one (1) opportunity to appeal to the program director.

Curricular Plan

A Curricular Plan provides a roadmap for completing this academic program and the UB Curriculum on time. Your actual plan may vary depending on point of entry to the university, course placement and/or waivers based on standardized test scores, earned alternative credit and/or college transfer credit.

YEAR 1

Fall Semester

- UB Seminar Credits: 3
- STA 119LEC - Statistical Methods Lecture Credits: 3
- STA 119REC - Statistical Methods Credits: 1
- ENG 105LEC - Writing and Rhetoric Credits: 4 ***OR*** Pathway Credits: 3
- MTH 141LR - College Calculus I Credits: 4

  Total Credits: 14 or 15

Spring Semester

- CSE 115LLR - Introduction to Computer Science I Credits: 4
- PUB 101LEC - Introduction to Public Health Credits: 3
- Elective Credits: 3
- ENG 105LEC - Writing and Rhetoric Credits: 4 ***OR*** Pathway Credits: 3
- MTH 142LR - College Calculus 2 Credits: 4

  Total Credits: 17 or 18

YEAR 2

Fall Semester

- MTH 241LR - College Calculus 3 Credits: 4
- Pathway Credits: 3
- Pathway Credits: 3
- STA 301LEC - Intro to Probability Lecture Credits: 3
- STA 301REC - Intro to Probability Credits: 1
- Scientific Literacy and Inquiry 1 Credits: 3

Total Credits: 17

Spring Semester

- STA 302LEC - Intro Stat Inference Lecture Credits: 3
- STA 302REC - Intro Stat Inference Credits: 1
- Communication Literacy 2 (ENG 353 recommended) Credits: 3
- Pathway Credits: 3
- Pathway Credits: 3
- MTH 309LR - Introductory Linear Algebra Credits: 4

Total Credits: 17

YEAR 3

Fall Semester

- UBC 399MNT - UB Curriculum Capstone Credits: 1
- Pathway Credits: 3
- STA 403LEC - Regression Analysis Credits: 3
- Pathway Credits: 3
- Scientific Literacy and Inquiry 2 Credits: 3
- Scientific Literacy and Inquiry Lab Credits: 1

Total Credits: 14

Spring Semester

- Stats Elective Credits: 3
- STA 404LEC - Design of Experiments Credits: 3
- Elective Credits: 3
- Elective Credits: 3
- Stats Elective Credits: 3

Total Credits: 15

YEAR 4

Fall Semester

- Stats Elective Credits: 4
- 300/400-level Elective Credits: 3
- 300/400-level Elective Credits: 3
- Elective Credits: 4

Total Credits: 13

Spring Semester

- Elective Credits: 3
- 300/400-level Elective Credits: 3
- 300/400-level Elective Credits: 3
- 300/400-level Elective Credits: 3

Total Credits: 12

TOTAL CREDITS REQUIRED: 120

Note: Some classes may count toward both a major and UB Curriculum requirement.

Learning Outcomes

Students completing the statistics major are expected to have demonstrated knowledge of the following:

- An understanding of probability theory, its application to everyday

problems and the important role probability plays in data analysis and decision making
- The ability to identify the proper statistical technique needed for the analysis of data in a variety of contexts
- How to design data collection experiments in a way that allows for optimal decision making while being subject to real-world constraint

Total Credit Hours Required represents the minimum credits needed to complete this program, and may vary based on a number of circumstances. This should not be used for financial aid purposes.

*Registration in this course provides the student with a stats lab resource with a teaching assistant in 806 Kimball. The teaching assistant is available for questions. Please check the hours of the stats lab as they change each semester. Student sign in sheet is required.

Minor in Statistics

Our department also offers a Minor in Statistics. This 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.

Introductory Courses (12 credits)

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

- MTH 141LR - College Calculus I Credits: 4 ***OR***
- MTH 121LR - Survey of Calculus and Its Applications I Credits: 4 ***OR***
- MTH 131LR - Mathematical Analysis for Management Credits: 4

- MTH 142LR - College Calculus 2 Credits: 4 ***OR***
- MTH 122LR - Survey of Calculus and Its Applications II Credits: 4
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- STA 119LEC - Statistical Methods Lecture Credits: 3 ***AND***
- STA 119REC - Statistical Methods Credits: 1

Statistics Core (14 credits)

- STA 301LEC - Intro to Probability Lecture Credits: 3 ***AND***
- STA 301REC - Intro to Probability Credits: 1 ***OR***
- MTH 411LR - Probability Theory Credits: 4
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- STA 302LEC - Intro Stat Inference Lecture Credits: 3 ***AND***
- STA 302REC - Intro Stat Inference Credits: 1 ***OR***
- MTH 412LR - Introduction to Statistical Inference Credits: 4
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- STA 403LEC - Regression Analysis Credits: 3
- STA 404LEC - Design of Experiments Credits: 3

Total Credits Required for Major: 26

Academic Requirements

GPA 2.500 required in introductory courses.

Learning Outcomes

Students completing the statistics major are expected to have demonstrated knowledge of the following:

- An understanding of probability theory, its application to everyday problems and the important role probability plays in data analysis and decision making.
- The ability to identify the proper statistical technique needed for the analysis of data in a variety of contexts.
- How to design data collection experiments in a way that allows for optimal

decision making while being subject to real-world constraint.

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 sphhp-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.

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 306 Intro to Statistical Computing w/SAS I

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. Prerequisite STA 119 or permission of instructor

STA 309 Stat Quality Control

This course is an introduction to the fundamental ideas of statistical quality control. We will discuss what is meant by quality improvement and the DMAIC (define, measure, analyze, improve, control) process, important statistical methods used in quality control and improvement, statistical process control control charts and other selected topics may be introduced such as capability analysis other types of control charts and techniques, and experimental design and acceptance sampling

STA 403 Regression Analysis

Covers regression analysis and introduction to linear models. Topics include point estimation, confidence intervals, hypothesis testing, simple linear regression, multiple regression, analysis of covariance, and nonlinear regression. The course

uses statistical software and emphasizes hands-on applications to data sets from a variety of settings. Prerequisite: STA 301 and STA 302

STA 404 Design of Experiments

Covers statistical methods for planning, conducting, and analyzing experiments to optimize a process. Topics include point estimation, confidence intervals, hypothesis testing, ANOVA models for 1, 2, and k-way classifications, multiple comparisons, randomized complete block designs, Latin square designs, and factorial designs. The course uses statistical software and emphasizes hands-on applications to data sets from a variety of settings.

STA 411 Stochastic Processes

This course is an introduction to the fundamental ideas of stochastic (or random) processes. The main topics we will study include classical gambling problems, random walks, Markov chains, Poisson processes, birth and death processes, queues, and reliability and renewal. Selected other topics, such as branching and Brownian motion, may also be included if time permits.

STA 415 Distribution Free Inference

This course is an introduction to distribution free inference, which is an area of statistics in which little or no assumptions are made about the distributional form of the population from which the data are sampled. Many authors use distribution free and nonparametric interchangeably, although in the latter case, the population is not assumed to fit any parametrized distribution.

STA 431 Methods of Survey Samples

STA 461 Applied Time Series Analysis

This course is an introduction to time series, which are ordered series of data points collected over time. Sampling adjacent points in time often leads to correlated data, which restricts the applicability of many conventional statistical methods (most of which assume the data are independent and identically distributed, or iid). The main topics discussed in this course are: characteristics of time series, correlation, stationarity, time series regression, exploratory data analysis, ARMA models, and ARIMA models. Time permitting, there may also be some other special topics included.

STA 471 Topics in Statistics I

STA 472 Topics in Statistics II