

EPIDEMIOLOGY AND BIostatISTICS, MS

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Degree: Master of Science (MS)
Field of Study: Epidemiology and Biostatistics

Program Overview

The Department of Population and Quantitative Health Sciences offers a revolutionary new, Master of Science (MS) Program in Biostatistics (and a BS/MS paired with any BS major), a discipline in high and exploding demand. The program can be done intensively in 11 months, or at a slower pace to finish in 1.5 or 2 years. Part-time students are welcome to do the program at their preferred pace! The program was designed after extensive interviews were conducted with a wide array of potential employers to make sure our graduates will have the edge in a marketplace that has been rapidly changing, while also prepared to continue in a PhD program. More and more, biostatisticians are expected to have familiarity with the area of application. The CWRU MS Biostatistics program reflects these new needs. Students may elect to take the program part-time and complete it at their own pace.

Picture yourself saving and improving lives:

- Analyzing data from health studies to determine the best treatment
- Working with data from millions of patients
- Identifying genes linked to specific diseases
- Using data to develop instruments to measure latent constructs like psychosocial well-being

There are four tracks our students can choose from Biostatistics, Genomics & Bioinformatics, Health Care Analytics, and Social & Behavioral Science.

Students do internships at leading academic medical centers and research centers, at the National Institutes of Health and in industry. Graduates are going on to jobs at leading health institutions and getting funded PhD slots at top Universities.

General Requirements

Students must satisfy the requirements of the School of Graduate Studies as stated here, as well as those outlined by the Biostatistics program. The MS program in Biostatistics offers "Plan B", as defined by the CWRU School of Graduate Studies. For Plan B, the student must successfully submit and pass their written internship/practicum project.

Important Note: The program information contained on this page is current as of July 1st, 2022. For the most current information, we advise you to review the MS in Biostatistics program handbook. You can find the most recent Program Handbook [here](#).

For current CWRU undergraduate students: The MS in Biostatistics program is an eligible program for those seeking a BS/MS Integrated

Program, which allows for the completion of both a BS (any major) and an MS in Biostatistics in 4 – 5 years. This program is intended to be an honors graduate program for highly motivated and qualified BS students who wish to pursue an advanced degree. Students admitted to the Program may, in their junior and/or senior year, take up to nine credit hours of graduate courses that will count toward both BS and MS requirements. Students interested in the BS/MS program must have a minimum GPA of 3.0 and 75 completed credit hours of coursework, but less than 90 completed credit hours (i.e. obtained Senior status).

Graduate Policies

For graduate policies and procedures, please review the School of Graduate Studies section of the General Bulletin.

Program Requirements

Core Courses

Code	Title	Hours
PQHS 414	Data Management and Statistical Programming	3
PQHS 431	Statistical Methods I	3
PQHS 432	Statistical Methods II	3
PQHS 453	Categorical Data Analysis	3
PQHS 490	Epidemiology: Introduction to Theory and Methods	3
PQHS 502	Introduction to Statistical Consulting	1
PQHS 602	Practicum (Internship/Practicum)	3
Total Hours		19

The biostatistics-track students will receive a carefully designed balanced training in biostatistical theories, methods, and biomedical applications. This track student will gain mastery of basic probability theory and statistical inference, learn the methods of survival and longitudinal data analysis, and still have the flexibility to choose an elective from advanced courses. The didactic methods and theory, and hands-on analytical training would lead to either the pursuit of an advanced relevant degree and/or work as a master's level biostatistician in various settings, e.g. academia, industry, hospitals, Pharmaceutical companies or government agencies.

Track Leader:

Dr. Abdus Sattar, PhD
Email: sattar@case.edu
Phone Number: 216.368.1501
Website: sattar.case.edu

Code	Title	Hours
Required Courses (9 Credits)		
PQHS 435	Survival Data Analysis	3
PQHS 480	Introduction to Mathematical Statistics	3
PQHS 459	Longitudinal Data Analysis	3
Select 1 of the following Track Electives (3 Credits)		
PQHS 471	Machine Learning & Data Mining	3
STAT 426	Multivariate Analysis and Data Mining	3
PQHS 450	Clinical Trials and Intervention Studies	3

Genomics and Bioinformatics Track:

Students will be trained to work in genomics and bioinformatics areas. In addition to the basics in biostatistics, they will learn the designs, methods, techniques, and tools that are commonly used in genetic

epidemiology, statistical genomics, and bioinformatics research. Big Data methods of data mining and machine learning are also required in this track. Target job positions are analyst, statistician and bioinformatics in genomics or genetic epidemiology research team in a research institute/university, pharmaceutical or biotech company.

Track Leader:

Fredrick Schumacher
Email: frs2@case.edu
Phone Number: 216.368.0351

Code	Title	Hours
Required Track Courses (12 Credits)		
PQHS 471	Machine Learning & Data Mining	3
PQHS 451	A Data-Driven Introduction to Genomics and Human Health	3
PQHS 452	Statistical Methods for Genetic Epidemiology	3
PQHS 457	Current Issues in Genetic Epidemiology: Design and Analysis of Sequencing Studies	3

Health Care Analytics Track:

Biostatistics is a vital part of clinical research, which includes both observational studies and randomized clinical trials. Modern clinical, or patient, research takes advantage of innovative methodologies for the design and analysis of such studies to increase the likelihood of success and minimize patient burden and the use of scarce resources. Clinical research biostatisticians work as part of multi-disciplinary teams with clinical and statistical investigators to develop and execute study designs and analysis plans with scientific rigor and in support of regulatory requirements by sanctioning bodies and funding agencies. Principal roles include the design, analysis, coordination and reporting of observational and trial-based clinical research studies. Most of a clinical research biostatistician's work is dedicated to evaluating, executing and reporting on well-designed studies to help investigators meet their scientific objectives. Related job titles include biostatistician, lead, senior or principal biostatistician, consulting statistician, statistical researcher, statistical programmer, clinical informaticist, data scientist and clinical research manager. Such positions require strong written and verbal communication skills, and the ability to work as part of a team with subject matter experts on protocol development and statistical reporting. Biostatisticians completing the Health Care Analytics track will be well-positioned to apply for positions in industry, academia (including teaching hospitals), pharmaceutical companies and government.

Track Leader:

Thomas Love, PhD
Email: tel3@case.edu
Phone Number: 216.778.1265

Code	Title	Hours
Required Track Courses (6 Credits)		
PQHS 435	Survival Data Analysis	3
PQHS 515	Secondary Analysis of Large Health Care Databases	3
Select 2 of the following Track Electives (6 Credits)		
PQHS 459	Longitudinal Data Analysis	3
PQHS 500	Design and Analysis of Observational Studies	3

PQHS 450	Clinical Trials and Intervention Studies	3
PQHS 471	Machine Learning & Data Mining	3

Social and Behavioral Sciences Track:

Students will be trained to work as analysts and research assistants in the social and behavioral sciences, including anthropology, sociology, psychology, psychiatry, and social work. Students will be trained in the most common study designs and analytic methods in these application areas. Such work often involves collaboration with multidisciplinary teams in community-practice / biomedical settings, with a focus on developmental, social/behavioral, cognitive, and/or mental health outcomes. This track is intended for students whose undergraduate work involved a major or minor in one of the social and behavioral sciences. It was created to serve the needs of social and behavioral science researchers who need research analysts trained in statistics, but with an understanding of their field and familiarity with qualitative and mixed methods as well. Target job positions are in academia, government, and research institutes.

Track Leader:

Arin Connell, PhD
Email: arin.connell@case.edu
Phone Number: 216.368.1550

Code	Title	Hours
Required Track Courses (12 Credits)		
PQHS 459	Longitudinal Data Analysis	3
MPHP 482	Qualitative and Mixed Methods in Public Health	3
NURS 632	Advanced Statistics: Structural Equation Modeling	3
PSCL 412	Measurement of Behavior	3

Graduates from accredited universities and colleges will be considered for admission to the department. All applicants must satisfy both CWRU and department requirements for graduate admission. The MS program in Biostatistics consists of a 16-credit core curriculum, plus a 12 credit major and a 3 credit internship or practicum.

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