Master of Science in Biostatistics

Information Session
Theory & Methods Track
Emilia Bagiella, PhD & Emma K. T. Benn, DrPH
Program Co-Directors

Web: www.icahn.mssm.edu/MSbiostat
Email: MSbiostat@mssm.edu
Overview

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About ISMMS

1. Chartered in 1963

2. Mission is to **rigorously train the next generation** of scientists and health professionals.

3. **Almost 1200 graduate and medical students** enrolled in the 2014/2015 year

4. Leader in medical and scientific training, biomedical research and patient care.

5. **Committed to intellectual exchange, multidisciplinary teamwork and innovation** that can lead to discoveries and advances to **improve the human condition**.
Research at ISMMS

New Blood Signature Analysis May Help Diagnose Parkinson’s Disease Earlier
April 6, 2015

Blood Test Predicts Severity of Peanut and Seafood Allergies
April 1, 2015

Mount Sinai Scientists Establish Link Between Neurodegenerative Disease and the Body’s Response to Viral Infection
March 30, 2015
A key protein previously implicated in Lou Gehrig’s disease and other neurological diseases plays an important role in the response to viral infection.

Mount Sinai Researchers Discover Genetic Origins of Myelodysplastic Syndrome Using Stem Cells
March 27, 2015
Findings Shed Light on the Development of Blood Cancers
The Center for Biostatistics at ISMMS

- Established in 2011
- 16 faculty members
- 10 MS statisticians

- Promote successful clinical and translational research at Mount Sinai
- Educate medical students, graduate students, postdoctoral fellows, and other research staff
The Center for Biostatistics at ISMMS

1. Educational Programs
   • MPH Biostatistics track
   • **MS in Biostatistics**
     • Theory and Methods Track
     • Clinical Applications Track (For Clinical Professionals)
   • Biostatistics Summer Program for Clinical Research
   • The Applied Statistics in Biological Systems (ASIBS) Short Course
   • Support to the Clinical Research Program
Examples of research our MS Biostatisticians have contributed to:


What is Biostatistics?

http://www.worldofstatistics.org/2013/02/11/biostatistics-unveiled/
What is Biostatistics?

Biostatistics is a branch of statistics that allows for the analysis and interpretation of scientific data generated in the clinical, public health, biomedical and translational sciences.

"By a small sample, we may judge of the whole piece." - Miguel de Cervantes (from Don Quixote)
What is Biostatistics?

Areas where STATISTICS are used

- **Business**
  - Economics, Engineering, Marketing, Computer Science

- **Physical Sciences**
  - Astronomy, Chemistry, Physics

- **Health & Medicine**
  - Genetics, Clinical Trials, Epidemiology, Pharmacology

- **Government**
  - Census, DOH, NCHS, CDC, FDA, NIH

- **Environment**
  - Agriculture, Ecology, Forestry, Animal Populations

Adapted Figure from the American Statistical Association
Master of Science in Biostatistics – Program Overview

1. Sponsored by Center for Biostatistics & Department of Population Health Science and Policy at ISMMS

2. Designed to prepare individuals for:
   • Career as data analysts and applied statisticians in the biomedical sciences
   • PhD/DrPH in Biostatistics or Epidemiology or Bioinformatics

3. Distinctive, accelerated design
   • One year, full-time program
   • Comprehensive didactic training for conducting high-quality clinical and translational research
   • Curriculum emphasizes strong quantitative training to address complex challenges

4. Student-centered
   • Small cohort size (5 – 10 students)
   • Excellent mentorship and individualized attention

5. Uniquely positioned
The Graduate School of Biomedical Sciences

Science That Changes Medicine

The Graduate School is uniquely positioned within a world-class medical school and health system. We have broken down the barriers to collaboration, allowing students to connect science, biostatistics, medicine, education and health care delivery.

Programs Across the Translational Health Continuum
- PhD Program (Basic Sciences)
- MD/PhD Program
- MS in Biostatistics
- MS in Biomedical Sciences
- PhD in Clinical Research
- MS Clinical Research
- MS in Genetic Counseling
- MS in Health Care Delivery Leadership
- Masters in Public Health
- MSW/MPH
- Summer Undergraduate Research Program
- Post Baccalaureate Research Education Program
- Clinical Research Education Program
- Advanced Certificate in Public Health
- Physician Scholars PhD Program

Basic Sciences PhD Multidisciplinary Training Areas
- Cancer Biology
- Developmental and Stem Cell Biology
- Design, Technology and Entrepreneurship
- Genetics and Genomic Sciences
- Immunology
- Microbiology
- Neuroscience
- Systems Biology of Disease and Therapeutics
- Structural/Chemical Biology and Molecular Design

Quick Facts
- Ranked 4th among U.S. medical schools for sponsored funding per investigator
- Over 225 Research Laboratories
Master of Science in Biostatistics – Program Eligibility

1. To be eligible for the MS in Biostatistics Program Theory & Methods Track, students must have:
   • At least two semesters of college-level calculus w/ grade of B or higher
   • At least 1 college-level linear algebra course w/ grade of B or higher
   • TOEFL for applicants from non-English speaking countries
   • GRE (optional)

2. Prior exposure to statistics/biostatistics not required

3. Knowledge of mathematical/statistical programming language not required, but certainly helpful
Master of Science in Biostatistics – Curriculum

1. One year curriculum = 31 core credits + ≥ 3 elective credits

<table>
<thead>
<tr>
<th>FALL TERM</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Introduction to Advanced Biostatistics</td>
<td>3</td>
</tr>
<tr>
<td>Fundamentals of Epidemiology</td>
<td>3</td>
</tr>
<tr>
<td>Probability &amp; Inference I</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to R Programming</td>
<td>1</td>
</tr>
<tr>
<td>Capstone</td>
<td>1</td>
</tr>
<tr>
<td>Clinical Trials Management (Elective)</td>
<td>3</td>
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<tr>
<th>SPRING I TERM</th>
<th>Credits</th>
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<tr>
<td>Theory of Linear and GLMs</td>
<td>3</td>
</tr>
<tr>
<td>Analysis of Categorical Data</td>
<td>3</td>
</tr>
<tr>
<td>Probability &amp; Inference II</td>
<td>3</td>
</tr>
<tr>
<td>Applied Biostatistics in Clinical Trials</td>
<td>3</td>
</tr>
<tr>
<td>Capstone</td>
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<thead>
<tr>
<th>SPRING II TERM</th>
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<tr>
<td>Analysis of Longitudinal Data</td>
<td>3</td>
</tr>
<tr>
<td>Survival Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Capstone</td>
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</tr>
<tr>
<td>Pharmacoeconomics (Elective)</td>
<td>3</td>
</tr>
<tr>
<td>Race and Causal Inference (Elective)</td>
<td>3</td>
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| Required Credits                               | 31      |
| Minimum Elective Credits                       | 3       |
| **Total Credits**                              | **34**  |
Master of Science in Biostatistics – Curriculum

1. Capstone Objectives

• **Engage students** in important discourse surrounding **data management and research ethics** – *Fall Term*

• **Challenge students to operationalize conceptual research questions** into testable hypotheses and to **determine the appropriate analytic methods** to test their hypotheses – *Spring I Term*

• **Provide students with the opportunity to shadow Biostatistics faculty** in the Center for Biostatistics consultation service – *Spring II Term*
  • Learn how to **successfully collaborate with non-statisticians** (primarily clinical faculty) at ISMMS
  • **Contribute appropriate study design-related and methodologic solutions** to cutting edge research questions
  • Conduct **mentor-guided preliminary analyses**
  • **Disseminate findings** to an institution-wide audience at the annual **MS in Biostatistics Capstone Symposium**
Master of Science in Biostatistics – Admissions

1. Theory & Methods Track Fall Application Deadline
   1. Priority Application Deadline: January 15th
   2. Final Application Deadline: February 15th

2. Online application: https://applygs.mssm.edu

3. Application components
   • Online application
     • Background and demographics
     • Personal statement (≤700 words) – motivation for applying and post-graduation career objectives
     • Current CV or resume
     • Non-refundable application fee ($80)
   • Official Transcripts – undergraduate and graduate (if applicable)
     • Mail to:
       ISMMS Office of Admissions
       One Gustave L. Levy Place
       Box 1002
       New York, NY, 10029
   • Two Letters of Recommendation
     • Recommenders email LORs directly to admissions@mssm.edu
   • GRE (optional) and TOEFL (if international and non-English speaking) to School Code 2464
Master of Science in Biostatistics – Tuition & Financial Aid

1. Application fee $80

2. Tuition is currently $41K

3. Student and Activity Fees are $150

4. Health Insurance Required

5. Financial Aid Available
Master of Science in Biostatistics – Tuition & Financial Aid

1. Eligible students submit the FAFSA. (US Citizen/eligible non-citizen)

2. Types of aid available
   - Stafford Loans
   - Federal Direct Graduate PLUS
   - Private Loans

3. We recommend applying for financial aid by August 1st

4. School code is G07026

5. FAFSA Website https://fafsa.ed.gov/
Master of Science in Biostatistics – Tuition & Financial Aid

Stafford Loans Unsubsidized

- $26,000/year
- Repayment begins 6 months after graduation

Direct Plus Loans

- Credit based and covers full out-of-pocket cost including living expenses
- Repayment begins immediately, but can be deferred while enrolled
Master of Science in Biostatistics

Resources

- ISMMS: www.icahn.mssm.edu
- Center for Biostatistics: www.icahn.mssm.edu/centerforbiostatistics
- MS in Biostatistics Program Website: www.icahn.mssm.edu/MSbiostat
- MS in Biostatistics Program Email: Msbiostat@mssm.edu
- MS in Biostatistics Program Co-Directors:
  - Emilia Bagiella, PhD – emilia.bagiella@mountsinai.org
  - Emma K. T. Benn, DrPH – emma.benn@mountsinai.org
- MS in Biostatistics Administrative Educational Coordinator:
  - Mary Sandre – mary.sandre@mountsinai.org
- Housing Resources:
  - International House of New York: http://www.ihouse-nyc.org
Careers and Opportunities in Biostatistics

“Biostatisticians with advanced degrees can look forward to excellent career opportunities in government, industry, and academia.” – American Statistical Association

Career opportunities:

• Academic Medical Centers
• Pharmaceutical Industry
• Contract Research Organizations (CROs)
• US Food and Drug Administration
• Centers for Disease Control & Prevention
• State Departments of Health
• US Census Bureau
• National Institutes of Health
• Foundations
Careers and Opportunities in Biostatistics

1. Clinical Trials Design and Conduct
2. Public Health applications
3. Quality Control
4. Genetics and Genomics
5. Basic Sciences
6. Personalized Medicine
7. Big Data
8. Teaching
Careers and Opportunities in Biostatistics

1. Job placement within 3-4 months from graduation
2. Median salary at first hire: $60K - $70K
3. Opportunities for growth
I used to think correlation implied causation.

Then I took a statistics class. Now I don't.

Sounds like the class helped. Well, maybe.