**SACKLER INSTITUTE OF
GRADUATE BIOMEDICAL SCIENCES**

MASTER OF SCIENCE IN BIOMEDICAL INFORMATICS

MESSAGE FROM THE DEAN

Dear Aspiring Students,

We are witnessing a golden age in the biomedical sciences. A limitless parade of discoveries and technologies continues to advance our knowledge of the world. These innovations present new approaches to combat human diseases. The Sackler Institute of Graduate Biomedical Sciences at NYU School of Medicine provides a solid path leading to a Master of Science in Biomedical Informatics, a PhD, or an MD/PhD. Our mission is to train the next generation of researchers so that you, too, could contribute to breakthroughs and advance society at large in many ways.

Becoming an accomplished researcher requires an inquisitive mind and perseverance. It also calls for active mentorship and hands-on research experience. Sackler students receive rigorous training to become independent scientists. They learn to hone innate curiosity, be critical thinkers, versatile problem solvers, team players, and future leaders.

I invite you to explore these pages to learn more about the Sackler Institute and discover the exceptional nature of our degree programs. You are welcome to contact us if you have questions.

Sincerely,

Naoko Tanese, PhD
Associate Dean for Biomedical Sciences
Director, Sackler Institute of Graduate Biomedical Sciences
Professor, Department of Microbiology

Program Administration

Susanne Tranguch, PhD, MBA
Assistant Dean for Biomedical Sciences
Research Assistant Professor, Department of Cell Biology

Kelly Ruggles, PhD
Director, Academic Programs
Assistant Professor, Department of Medicine

Lisabeth Greene, MA
Assistant Director, Graduate Student Services

Jessica Dong, MA
Program Manager

MESSAGE FROM THE DIRECTOR

Dear Aspiring Students,

Biomedical data are being generated at an unprecedented rate both in basic science research and clinical labs and have the potential to fundamentally change our approach to health care. During the last few decades we have seen highly successful technological developments in sequencing, mass spectrometry, and microscopy, which have resulted in dramatic improvements in data quality with a simultaneous drop in data generation costs. However, these data are complex and heterogeneous, requiring new approaches for data analysis to fully extract the information and use it to better understand basic biology, translate discoveries into the clinic, and improve patient care. Our master's program in biomedical informatics will provide you with the knowledge and tools to participate in this transformation of health care. You will learn diverse methods for integrating detailed measurement of the genome, transcriptome, proteome, metabolome, and clinical variables, and apply these methods to develop new diagnostics and pharmaceuticals to move us closer to realizing the dream of precision medicine.

Please feel free to contact us if you have any questions or would like to find out more about the program.

Sincerely

David Fenyö, PhD
Director, Master's Program in Biomedical Informatics
Professor, Department of Biochemistry and Molecular Pharmacology

Program Administration

Yindalon Aphinyanaphongs, MD, PhD
Program Academic Advisor, Clinical Informatics
Assistant Professor, Department of Population Health

Kelly Ruggles, PhD
Program Academic Advisor, Biomedical Informatics
Assistant Professor, Department of Medicine

OUR PROGRAM

Biomedical Informatics (BMI) is a field in which individuals create and apply computational and quantitative methods for biomedical research and health care. The recent explosion of high-throughput genomics technologies has created a critical demand for skilled BMI professionals.

The master's program in biomedical informatics at NYU Sackler Institute of Graduate Biomedical Sciences interconnects three components:

- **Bioinformatics:** focuses on computational and statistical methods for the analysis of large biological datasets
- **Medical Informatics:** aims to teach storage and management of medical data, and knowledge- and evidence-driven application to patient therapies
- **Translational Bioinformatics:** integrates bioinformatics with medical informatics in order to transfer results "from the bench to the bedside"

Timeline

The program is designed with a one-year curriculum to teach practical skills that span basic science, translational science, and medical research with the goal of developing professionals who can readily solve modern informatics challenges.

Topics of the master's program include:
- molecular signatures and precision medicine
- machine learning methods
- biomedical information retrieval and scientometrics
- high-throughput assay informatics (next-generation sequencing, proteomics, metabolomics, and image analysis)
- modeling and simulation of biological systems

Students in the program will:
- learn fundamental computer science and biostatistics skills, in addition to computational skills for analyzing complex genomic and medical data
- obtain necessary domain knowledge of molecular biology and medical science to facilitate communication and collaborative research with clinical and basic scientists
- study the history of important innovations in bioinformatics and the algorithms underlying methods that are currently in use
- develop skills for creating, validating, benchmarking, and deploying bioinformatics methods
- enhance skills for consulting, communication, and teamwork

Sample Curriculum

Summer I: Introductory Classes

- Introduction to Programming (Python)
- Programming for Data Analysis (R)
- Introduction to Biomedicine

Fall: 4 Core Classes

- Methodological Foundations of Biomedical InformaticsI
- Introduction to Health Informatics
- Bioinformatics
- Machine Learning
- Seminar in Biomedical Informatics

Spring: 2 Electives + Practicum
- Master Practicum I
- Electives
- Seminar in Biomedical Informatics

Summer II: Practicum

- Master Practicum II

BMI Master Practicum I & II (Total 10 credits)

All students must complete at least one of the following practicum under the mentorship of faculty chosen by the student or with a mentor approved by the academic advisor:

- Research Practicum: involves the students in a summer-long bioinformatics research project in the field of biomedical research
- Industry Practicum: engages the students for a summer semester in the real-life complexities of research in pharmaceutical companies and other appropriate NYU industry affiliates
- Consulting Practicum: embeds the students in consulting and collaborative science service for a semester to develop collaborative skills and become exposed to the plethora of real-life projects in an academic medical center

Washington Square Park Monument, NYU

TUITION (2017–2018)

Tuition is charged according to the scale of the NYU Graduate School of Arts and Science (GSAS). GSAS charges tuition on a credit basis. Students must obtain a minimum of 32 credits for the master's degree. A full-time course load is typically 12 credits per semester for master's programs.

Credits Enrolled	Tuition	Registration and Services Fees	Total
4	$6,892.00	$726.00	$7,618.00
8	$13,784.00	$1002.00	$14,786.00
12	$20,676.00	$1,278.00	$21,954.00

Deferred Computer Charge

The New York University bookstore/computer store offers students the option to defer payment of a portion of their computer purchase and be billed in equal installments on the student invoice.

Finance Charge

A finance charge will be imposed on unpaid student accounts from the first day of classes until the outstanding balance is paid in full. The amount of the finance charge is determined by applying a periodic rate of 1% per month to the "average daily balance" of your account. The corresponding annual percentage rate is 12%.

The Office of the Bursar, the central billing and collection point for NYU, manages the university billing, collecting, refunding, and cashiering functions.

CAREER DEVELOPMENT

The Sackler Institute partners with the NYU Wasserman Center for Career Development to host workshops and seminars to help your career path. We have a dedicated team for our graduate students. Examples of offerings include Networking 101, Virtual Career Fairs, Myers-Briggs Type Indicator (MBTI) personality assessment, CV preparation, and 1:1 advising.

Mentors

Available mentors in Bioinformatics and Clinical Informatics, along with their research interests, are listed below.

Bioinformatics

Mentor	Research Area
Jef Boeke, PhD	Using systems biology to understand mobile elements in the eukaryotic genome
Richard Bonneau, PhD	Systems biology and protein modeling
Aravinda Chakravarti, PhD	Genetic dissection of human complex diseases
Zhe Chen, PhD	Signal processing, machine learning, computational statistics, biomedical and neural engineering, computational neuroscience
Teresa Davoli, PhD	Applies systematic approaches (computational and experimental) to understand the consequences of genomic copy number alteration in human cancer and normal physiology
David Fenyö, PhD	Dynamics of cellular processes
Kasthuri Kannan, PhD	Genomics and bioinformatics
Tomas Kirchhoff, PhD	Identifying the genetic basis of cancer susceptibility
Arnon Lieber, PhD	Bacterial ecology, microbiome informatics, autoimmunity and inflammation.
Timothee Lionnett, PhD	Developing imaging techniques to understand transcription dynamics, systems analysis of mechanosensing in cells
Matthew Maurano, PhD	Developing genomic approaches to gene regulation and studying their application to common human diseases
Charles Peskin, PhD	Mathematical modeling and computer simulation for problems arising in biology and medicine
Aaditya Rangan, PhD	Large-scale scientific modeling of physical, biological, and neurobiological phenomena, and the development of efficient numerical methods and related analysis
Matthew Rockman, PhD	Evolutionary and molecular causes of heritable variation in animals

Bioinformatics Continued

Kelly Ruggles, PhD	Multi-omic integration, data visualization and mathematical modeling in cancer and the microbiome
Dennis Shasha, PhD, MS	Machine learning applied to genomics, proteomics, and causality networks
Mark Siegal, PhD	Evolutionary systems biology, robustness and evolution of complex traits
Dan Tranchina, PhD	Computational neuroscience, phototransduction, stochastic problems in cellular and molecular biology, statistical analysis and modeling of genome-scale data
Aristotelis Tsirigos, PhD	Computational genomics
Christine Vogel, PhD	Mass spectrometry, quantitative proteomics, dynamical systems, translation regulation, stress response, protein evolution
Itai Yanai, PhD	Understanding evolutionary biology and diseases through single cells

Clinical Informatics

Mentor	Research Area
Yindalon Aphinyanaphongs, MD, PhD	Information retrieval and machine learning in support of evidence-based medicine (EBM)
Jessica Athens, PhD	Novel uses of "big data," geographic determinants of chronic health conditions, and small area estimation
Saul Blecker, MD, MHS	Epidemiology, outcomes, and quality of care for heart failure and related chronic diseases such as diabetes
Scott Braithwaite MD, MSc, FACP	Optimizing quality and value in healthcare, incorporating methods of decision science, comparative effectiveness and cost effectiveness
Michael Cantor, MD	Biomedical informatics, healthcare IT, quality improvement, clinical genomics, personalized medicine, biomedical ontologies
Yu Chen, PhD, MPH	Environmental factors related to the risk of clinical and preclinical endpoints of cancer and cardiovascular disease
Josh Chodosh, MD	Understanding geriatric diseases through modeling
John Dodson, MD, MPH	Improving the health outcomes of older adults with cardiovascular disease
Leora Horwitz, MD, MHS	Systems and practices intended to bridge gaps or discontinuities in care
Joshua D. Lee, MD, MSc	Novel treatments of addiction, criminal justice populations, re-entry drug treatment, and medical education surrounding substance abuse
Devin Mann, MD, MS	Enhancing healthcare delivery using novel technologies
Jennifer McNeely, MD, MS	Addiction medicine
Richard Niederman, DDS	Epidemiology and health promotion
Kelly Quinn, PhD, MPH	Social determinants of chronic and infectious health outcomes with a focus on racial/ethnic, socioeconomic status and geographic inequities
Narges Razavian, PhD	Bridging the gap between machine learning and healthcare, in particular, using most advanced computational models to help with clinical research, including biomarker discovery, early detection, care quality control, patient similarity, and prediction of future outcomes
James Robinson, M.Ed.	Data management of adult and child psychiatric clinical trial networks
Mark Schwartz, MD	Macroscope electronic health record surveillance
Donna Shelley, MD, MPH	Tobacco control policy research, implementation science with a specific focus on studying healthcare system
Alisa Surkis, MS, PhD	MLS medical center efforts for research resource discovery and research networking

LIVING IN NEW YORK CITY

Housing

For students starting in the summer, it is possible to apply for summer housing (www.nyu.edu/summer/housing/rates.html) until permanent living arrangements are made. NYU Housing is quite limited, so we suggest students look for other housing options upon their decision to matriculate. Find New York City housing options information at www.nyu.edu/life/living-at-nyu/off-campus-living.html.

Eating and Entertainment

There are countless ways to enjoy New York City on a budget. In fact, some of the best things to do in NYC are free. For example, you can visit Central or Prospect Park; rent a bicycle through NYU's free bike share program (www.nyu.edu/life/sustainability/get-involved/bike-share.html) and ride down the West Side Highway; or stroll down the boardwalk in Coney Island.

Affordable Dining
Dining in New York City offers an array of options at every price point. Check out "Time Out's Cheap Eats" (www.timeout.com/newyork/restaurants/cheap-eats), ny.com or citysearch.com for the best bites that fill you up without emptying your wallet.

Broadway Shows and Concerts
NYU Ticket Central sells student discounted tickets to concerts, comedy shows, movies, and more. Also, visit one of the TKTS Discount Booths for Broadway and off-Broadway show tickets at 25%–50% off (www.tdf.org/nyc/7/TKTS-ticket-booths). Even the Metropolitan Opera has a student discount program—visit the website to learn more (www.metopera.org/season/tickets/student-tickets/). Don't forget to check out the Time Out New York website for a list of free events by day.

Museums
Most museums offer student rates and even free entry days. Current NYU students also have free access to many New York museums through the NYU Museum Gateway program (www.nyu.edu/life/arts-culture-and-entertainment/free-museum-access.html).

OUR MISSION

The Sackler Institute is dedicated to the mission of training future scientists and critical thinkers by creating an environment supportive of scientific discovery and professional growth.

We achieve this by:

- developing and managing high-quality academic programs for our student scholars, including opportunities to engage in cutting-edge research at a world-renowned academic medical center.

- providing an environment in which students integrate with our research community to not only gain expertise and excel at original research in their fields, but also to develop skills spanning any career, i.e., critical thinking, problem solving, ethical training, and oral and written communication.

- working to advance the diversity of graduate education through recruitment, retention, and support of underrepresented groups.

- continually evaluating our academic programs and establishing initiatives to best fit the needs of our community in a changing research landscape.

Application opens August 1, 2018

https://apply.sackler.med.nyu.edu/apply/