Biomedical Informatics Graduate Program at Stony Brook University
(The State University of New York at Stony Brook)

Stony Brook University, the flagship State University of New York, is a member of the prestigious Association of American Universities (AAU) and co-manager of the nearby Brookhaven National Laboratory (BNL). It is located on Long Island, close to beaches and New York City.

Biomedical Informatics (BMI) is an interdisciplinary field that investigates and explores the effective use of biomedical data, information and knowledge for scientific inquiry, problem-solving and decision-making, driven by efforts to improve human health. Stony Brook embeds BMI’s computer engineering and applied sciences education in research and operations at a major medical center, where quantitative sciences have emerged at the very core of efforts to understand, prevent and treat diseases. The department is also part of the AI Institute and the Institute for Engineering-Driven Medicine at Stony Brook University.

The Department of Biomedical Informatics is dually housed in the School of Medicine and in the College of Engineering and Applied Sciences. Our students can access resources from both schools. BMI faculty conducts cutting-edge interdisciplinary research in Data Science, Imaging Informatics, Systems Biology, Computational Biology and Bioinformatics, Clinical Informatics, Computational Science, Population Health, AI in Healthcare and Visualization. Graduates can expect careers in academia, research institutions, hospitals, industry and government. Students also have opportunity for summer internships in major companies around New York City.

For graduate programs, we offer Ph.D. degrees, M.S. degrees and Advanced Graduate Certificates in three tracks:

- **Clinical Informatics**: Enhancing the quality and efficiency of clinical workflows
- **Imaging Informatics**: Integrative analysis and management of biomedical images
- **Translational Bioinformatics**: Application of informatics methods to advance patient-related biomedical research, from clinical genomics to population health

The application deadlines for Fall 2022 are February 20, 2022 for the Ph.D. program, and March 1, 2022 for the M.S. program and the Advanced Graduate Certificate program.

To apply, please go to: https://bmi.stonybrookmedicine.edu/education/prospective_students

The admission and degree requirements are detailed in the Stony Brook Graduate Bulletin. You can reach us at: (631) 638-2590 or BMIGradEd@stonybrookmedicine.edu or richard.Moffitt@stonybrookmedicine.edu

Our website: https://bmi.stonybrookmedicine.edu
Example Research Projects
From Glass Slides to Big Data to Knowledge

Glass slides → Slide Scanning → Whole Slide Images

- New machine/deep learning algorithms to extract, quantify and characterize features and complex patterns
- Innovative software tools to manage, process, explore extremely large volumes of image and feature data
- Novel methods to integrate imaging features and clinical outcome and genomic signature data

Big Data and AI Driven Opioid Epidemic Research

Web and social media → Spatial analysis and text mining → Patterns and knowledge → Engaging governments

Neighborhood Policies → Community at risk → Community outreach and intervention

Patients EHR → Deep learning based predictive modeling → Patients at risk → Clinical decision support

Radiomics and Radiogenomics for Precision Oncology

- Brain Cancer
- Prognosis
- Radiomics
- New Radiomics biomarkers to characterize CT/MRI
- Lung Cancer
- Diagnosis
- New pathomics biomarkers to characterize histology
- Breast Cancer
- Treatment Evaluation
- Radio-pathogenomics approaches for disease diagnosis, prognosis, and predicting response to treatment

Deep Learning Based Analysis of Immune and Tumor Cells for Tumor Microenvironment Study

Airway segmentation in CT image stacks:
Trace and classify the airways:

Single-Cell Deconvolution of the Pancreatic Tumor Microenvironment

Multiplex Immunohistochemistry (mIHC) Analysis

Keeping Optics and Human in the Loop of Microscopy Image Analysis

Biological Experiments
Record Time-Lapse Microscopy Images
Understand the Optics

Biological Discovery
Community
Develop Optics-Oriented Cell Image Analysis Algorithms

Example Research Projects

Predicting Response to Immunotherapy using Radio-Pathomic Tools

Lung CT Image Analysis

Blockchain Based EHR Data Sharing and Management

Solution Users (SU) - Patients (P) - Caregiver (C)
UI Provider (UIP) - mobile/web app
Auditors interrogate audit trails

The National Practitioner Data Bank

Chaincode Logic State

Auditors (A)
Chaincode (CA)
Orderer (O)
Membership Service (MS)
Reg A - ECA - TCA - TLS-CA

HIPAA Compliant Cloud Storage Service (CS)