MCSB Interdisciplinary Graduate Program Breadth Courses

The breadth courses for the MCSB M.S. and Ph.D. program listed below are divided into three categories according to their subject matter with Category I being mathematics-related, Category II, biology-related. Category III courses are biotechnology-related and may only be considered elective courses for students completing an MS degree. In Categories I and II, we denote by 'star' (*) courses that may be used either as core or elective courses. All courses are 4 units.

Category I (Mathematics, Computation and Modeling).

Mathematical and Computational Biology I (Math 227A, Fall)*
Dynamical Systems in Biology and Medicine (BME 233, Fall)*
Quantitative methods in ecology and evolutionary biology (EcoEvo 207, Fall)
Continuum Mechanics (Physics 222, Fall)
Computational Methods (Physics 229A, Fall)
Representations and algorithms for molecular biology (CS 284A, Fall)
Introduction to Artificial Intelligence (CS 271, Fall)
Machine Learning (CS 273A, Fall)
Probabilistic Learning: Theory and Algorithms (CS 274A, Fall)
Introduction to Bayesian Data Analysis (Statistics 205, Fall)
Statistical Methods 1: Linear Models (Statistics 210, Fall)
Introduction to Numerical Analysis & Scientific Computing (Math 225A, Fall)
Introduction to Numerical Analysis & Scientific Computing (Math 225B, Winter)
Computational Partial Differential Equations (Math 226A, Fall)
Computational Partial Differential Equations (Math 226B, Winter)
Methods in Applied Mathematics - S. Cao (Math 290A, Fall)
Methods in Applied Mathematics (Math 290B, Winter)
Probabilistic Modeling of Biological Data (CS 284B, Winter)
Image Understanding (CS 216, Winter)
Learning in Graphical Models (CS 274B, Winter)
Neural Networks and Deep Learning (CS 274C, Spring)
Bayesian Statistical Analysis – H. Stern (Stats 225, Fall)
Intermediate Probability and Statistical Theory (Stats 200A, Fall)
Intermediate Probability and Statistical Theory (Stats 200B, Winter)
Intermediate Probability and Statistical Theory (Stats 200C, Spring)
Statistical Methods II: Generalized Linear Models (Stats 211, Winter)
Quantitative Physiology: Organ Transport Systems (BME 221, Winter)
Linking Modeling and Experiments in Bio-Engineering (BME 215, Spring 2018)
Biophysics of molecules and molecular machines (Physics 230B, Winter)
Introduction to Numerical Analysis and Scientific Computing (Math 225C, Spring)
Statistical Methods for Data Analysis II (Stats 203, Spring)
Statistical Methods III: Methods for Correlated Data (Stats 212, Spring)
Modern Data Analysis Methods – B. Shahbaba (Stats 235, Spring)
Introduction to Computational Biology (MolBio 223 Spring)
Data Structures – M. Dillencourt (CS 261, Spring)
Computational Systems Biology (CS 284C, Spring)*
Deep Generative Models – S. Mandt (CS 295, Spring)
Mathematics and Computational Biology III (Math 227C, Spring)*

Category II (Biology and Biomedical Engineering).

Protein Structure and Function (MolBio 204, Fall)
Systems Neuroscience – R. Frostig (NeuroBio 208, Fall)
Principles of Genomics (DevBio 214, Fall)
Fundamentals of Informatics (Eco Evo 282, Fall)
Advanced Informatics for Biologists (Eco Evo 283, Winter)
Introduction to Proteomics (PhySio 252, Winter)
Cell and Tissue Engineering (BME 210, Winter)
Cell Biology (Dev Bio 231B, Winter)
Epigenetics in Health Disease (BioChem 225, Winter)
Spectroscopy and Imaging of Biological Systems (BME 238, Winter)
Linking Modeling and Experiments in Bioengineering (BME 215, Spring)
Advanced Developmental Genetics (DevBio. 210, Spring)
Regulation of Gene Expression (M&MG 206, Spring)* Needs approval from CMB, (Gary Roman).
Advanced Molecular Genetics (BioChem 207, Spring)
Signal Transduction and Growth Control (BioChem 212, Spring)
Population Dynamics (EcoEvo 251, Spring)*
Developmental Systems Biology (Dev Bio 203C, Spring)*
Cardiovascular Tissue Engineering (BME 212, Spring)
Eng. Human Potential – T. Downing (BME 295, Spring)
Neural Time Series (BME 295, Spring)
Neuroimaging Analysis (BME 234, Spring)
Puzzles in Modern Biology - S. Frank (EcoEvo 203B, Winter) (Needs Dr. Steve Frank's approval).

Category III (Biotechnology and Entrepreneurship).

Statistics for management (MBA 201A, Fall)
Biomedical microdevices (BME 261, Fall)
Foundations of Clinical and Translational Science (PH 290, Fall)
Entrepreneurship for scientists and engineers (ENG 280, Winter)
Technology for life (ENG 260A, Winter)

- Updated April, 2022 (T. Rimal)