

7 Required Core Courses (all courses are 4 units)

- Bio Core 1: Biophysics of Molecules and Molecular Machines (Physics 230A, Fall)
- Bio Core 2: Systems Cell Biology (Dev Bio 232, Winter)
- Bio Core 3: (A) Population Dynamics (Eco Evo 251, Spring) OR
(B) Developmental Systems Biology (Dev Bio 203C, Spring)
- Math/Comp Core 1: Mathematical and Computational Biology I (Math 227A, Fall)
- Math/Comp Core 2: Mathematical and Computational Biology II (Math 227B, Winter)
- Math/Comp Core 3: (A) Computational Systems Biology (ICS 284C, Spring) OR
(B) Mathematics and Computational Biology III (Math 227C, Spring)
- Critical Thinking in Systems Biology (Dev Cell 203A, Fall)

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 being biology-related, and Category III being biotechnology-related. 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)

Linking Modeling and Experiments in Bio-Engineering (BME 215, Spring 2018)
Quantitative Physiology: Organ Transport Systems (BME 221, Winter)
Dynamical Systems in Biology and Medicine (BME 233, Fall)*
Image Understanding (CS 216, Winter)
Machine Learning (CS 273A, Fall)
Probabilistic Learning: Theory and Algorithms (CS 274A, Fall)
Learning in Graphical Models (CS 274B, Winter)
Neural Networks and Deep Learning (CS 274C, Spring)
Representations and algorithms for molecular biology (CS 284A, Fall)
Probabilistic Modeling of Biological Data (CS 284B, Winter)
Computational Systems Biology (CS 284C, Spring)*
Quantitative methods in ecology and evolutionary biology (Eco Evo 207, Fall)
Introduction to Numerical Analysis & Scientific Computing (Math 225A, Fall)
Introduction to Numerical Analysis & Scientific Computing (Math 225B, Winter)
Introduction to Numerical Analysis & Scientific Computing (Math 225C, Spring)
Computational Partial Differential Equations (Math 226A, Fall)
Computational Partial Differential Equations (Math 226B, Winter)
Mathematical and Computational Biology I (Math 227A, Fall)*
Mathematics and Computational Biology II (Math 227B, Winter)*
Mathematics and Computational Biology III (Math 227C, Spring)*
Methods in Applied Mathematics (Math 290B, Winter)
Introduction to Computational Biology (MolBio 223 Fall)
Continuum Mechanics (Physics 222, Fall)
Computational Methods (Physics 229A, Fall)
Biophysics of molecules and molecular machines (Physics 230B, Winter)
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 for Data Analysis II (Stats 203, Spring)
Introduction to Bayesian Data Analysis (Stats 205, Fall)
Statistical Methods I: Linear Models (Stats 210, Fall)
Statistical Methods II: Generalized Linear Models (Stats 211, Winter)

Statistical Methods III: Methods for Correlated Data (Stats 212, Spring)

Category II (Biology and Biomedical Engineering)

Advanced Molecular Genetics (Bio Chem 207, Spring)
Signal Transduction and Growth Control (Bio Chem 212, Spring)
Epigenetics in Health Disease (Bio Chem 225, Winter)
Cell and Tissue Engineering (BME 210, Winter)
Cardiovascular Tissue Engineering (BME 212, Spring)
Linking Modeling and Experiments in Bioengineering (BME 215, Spring)
Neuroimaging Analysis (BME 234, Spring)
Spectroscopy and Imaging of Biological Systems (BME 238, Winter)
Neural Time Series (BME 295, Spring)
Developmental Systems Biology (Dev Bio 203C, Spring)*
Advanced Developmental Genetics (Dev Bio 210, Spring)
Principles of Genomics (Dev Bio 214, Fall)
Cell Biology (Dev Bio 231B, Winter)
Population Dynamics (Eco Evo 251, Spring)*
Fundamentals of Informatics (Eco Evo 282, Fall)
Advanced Informatics for Biologists (Eco Evo 283, Winter)
Regulation of Gene Expression (M&MG 206, Spring)
Protein Structure and Function (MolBio 204, Fall)
Introduction to Proteomics (Physio 252, Winter)

Category III (Biotechnology and Entrepreneurship)

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