Computer Science and Molecular Biology (Course 6-7)

Bachelor of Science in Computer Science and Molecular Biology

General Institute Requirements (GIRs)

The General Institute Requirements include a Communication Requirement that is integrated into both the HASS Requirement and the requirements of each major; see details below.

Summary of Subject Requirements	Subjects
Science Requirement	6
Humanities, Arts, and Social Sciences (HASS) Requirement; at least two of these subjects must be designated as communication-intensive (CI-H) to fulfill the Communication Requirement.	8
Restricted Electives in Science and Technology (REST) Requirement [can be satisfied by 5.12 and 6.C06[J] in the Departmental Program]	2
Laboratory Requirement (12 units) [can be satisfied by 7.003[J] or 20.109 in the Departmental Program]	1
Total GIR Subjects Required for SB Degree	17

Physical Education Requirement
Swimming requirement, plus four physical education courses for eight points.

Departmental Program

Choose at least two subjects in the major that are designated as communication-intensive (CI-M) to fulfill the Communication Requirement.

Required Subjects		Units
Mathematics and Introductory		
6.100A	Introduction to Computer Science Programming in Python [1]	6
6.1200[J]	Mathematics for Computer Science	12
6.C06[J]	Linear Algebra and Optimization	12
Chemistry		
5.12	Organic Chemistry I	12
5.601	Thermodynamics I	6
Introductory Laboratory		
Select one of the following:		15-18
7.002 & 7.003[J]	Fundamentals of Experimental Molecular Biology and Applied Molecular Biology Laboratory (CI-M)	
20.109	Laboratory Fundamentals in Biological Engineering (CI-M)	
Foundational Subjects		
Three Computer Science subjects:		
6.1010	Fundamentals of Programming	12
6.1210	Introduction to Algorithms	12
6.3900	Introduction to Machine Learning	12

or		
6.C01 & 7.C01	Modeling with Machine Learning: from Algorithms to Applications and Machine Learning in Molecular and Cellular Biology	
Three Biological Science subjects:		
7.03	Genetics	12
7.05	General Biochemistry [2]	12
7.06	Cell Biology	12

Restricted Electives

Computational Biology

Select one of the following:		12
1.088	Genomics and Evolution of Infectious Disease	
6.8701[J]	Computational Biology: Genomes, Networks, Evolution	
7.093 & 7.094	Modern Biostatistics and Modern Computational Biology [3]	
7.32	Systems Biology	
7.33[J]	Evolutionary Biology: Concepts, Models and Computation [3]	
18.413	Introduction to Computational Molecular Biology	

Technical Communication

Select one of the following:		9-12
6.UAR[J]	Seminar in Undergraduate Advanced Research (12 units, CI-M)	
6.UAT	Oral Communication (CI-M)	
7.19	Communication in Experimental Biology (CI-M)	
Select two subjects from any of the following lists: Biology Restricted Electives, AI+D Advanced Undergraduate Subjects, or Computational Biology.		24
Units in Major		**180-186**
Unrestricted Electives		**48**
Units in Major That Also Satisfy the GIRs		(36)
Total Units Beyond the GIRs Required for SB Degree		**192-198**

The units for any subject that counts as one of the 17 GIR subjects cannot also be counted as units required beyond the GIRs.

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[1] Students who enter MIT with sufficient programming experience may substitute *6.1020 Software Construction* (15 units) after taking *6.1010*.

[2] *5.07[J] Introduction to Biological Chemistry* is also an acceptable option.

[3] These subjects can count towards either the Computational Biology or the Biology restricted electives, but not both.

Biology Restricted Electives

7.08[J]	Fundamentals of Chemical Biology	12
7.093 & 7.094	Modern Biostatistics and Modern Computational Biology [1]	12
7.20[J]	Human Physiology	12

7.21	Microbial Physiology	12
7.23[J]	Immunology	12
7.24	Advanced Concepts in Immunology	12
7.26	Molecular Basis of Infectious Disease	12
7.27	Principles of Human Disease and Aging	12
7.28	Molecular Biology	12
7.29[J]	Cellular and Molecular Neurobiology	12
7.30[J]	Fundamentals of Ecology	12
7.31	Current Topics in Mammalian Biology: Medical Implications	12
7.32	Systems Biology	12
7.33[J]	Evolutionary Biology: Concepts, Models and Computation [1]	12
7.35	Human Genetics and Genomics	12
7.371[J]	Biological and Engineering Principles Underlying Novel Biotherapeutics	12
7.45	The Hallmarks of Cancer	12
7.46	Building with Cells	12
7.49[J]	Developmental Neurobiology	12
9.17	Systems Neuroscience Laboratory	12
9.26[J]	Principles and Applications of Genetic Engineering for Biotechnology and Neuroscience	12

AI+D Advanced Undergraduate Subjects

6.3730[J]	Statistics, Computation and Applications	12
6.4200[J]	Robotics: Science and Systems (CI-M)	12
6.5151	Large-scale Symbolic Systems	12
6.5831	Database Systems	12
6.7411	Principles of Digital Communication	12
6.8371	Digital and Computational Photography	12
6.8701[J]	Computational Biology: Genomes, Networks, Evolution	12
6.8711[J]	Computational Systems Biology: Deep Learning in the Life Sciences	12
18.404	Theory of Computation	12

[1] These subjects can count towards either the Computational Biology or the Biology restricted electives, but not both.