

# MIT Doctoral Program in Computational Science and Engineering

## Approved Computational Science and Engineering Subject List

*(Students must take at least 5 of the following graduate-level subjects.)*

Subject #	Subject Name	Term (F / S)	Notes
1.124J / 2.091J	Software and Computation for Simulation	F	Not offered regularly
1.125	Architecting & Engineering Software Systems	F	
1.204	Computer Modeling: From Human Mobility to Transportation Networks	S	
1.545	Atomistic Modeling & Simulations of Materials & Structures	F	
1.723	Computational Methods for Flow in Porous Media	S	
2.089J / 1.128J	Computational Geometry	S	Not offered regularly
2.093	Finite Element Analysis of Solids and Fluids I	F	Not offered 2016 – 17
2.094	Finite Element Analysis of Solids and Fluids II	S	
2.096J / 6.336J / 16.910J	Introduction to Numerical Simulation	F	
2.097J / 6.339J / 16.920J	Numerical Methods for Partial Differential Equations	F	
2.098	Introduction to Finite Element Methods for Partial Differential Equations	S	
2.29	Numerical Fluid Mechanics	S	
2.37	Fundamentals of Nanoengineering	S	
3.320	Atomistic Computer Modeling of Materials	S	Not offered 2016-17
4.450J / 1.575J	Computational Structural Design and Optimization	F	
6.231	Dynamic Programming and Stochastic Control	S	
6.251J / 15.081J	Introduction to Mathematical Programming	F	
6.252J / 15.084J	Nonlinear Optimization	S	
6.255J / 15.093J / IDS.200J	Optimization Methods	F	
6.256	Algebraic Techniques and Semidefinite Optimization	S	Not offered 2016-17
6.337J / 18.335J	Introduction to Numerical Methods	S	
6.581J / 20.482J	Foundations of Algorithms and Computational Techniques in Systems Biology	S	Not offered 2017-18
6.673	Introduction to Numerical Simulation in Electrical Engineering	S	Not offered Fall 2016 forward
6.867	Machine Learning	F	
10.34	Numerical Methods Applied to Chemical Engineering	F	
10.557	Mixed-integer and Nonconvex Optimization	S	
10.637J / 5.698J	Quantum Chemical Simulation	F	
12.515	Data and Models	F	
12.521	Computational Geophysical Modeling	S	Not offered 2017-18
12.620J / 6.946J / 8.351J	Classical Mechanics: A Computational Approach	F	

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12.714	Computational Data Analysis	S	Not offered 2016-17
15.062J / IDS.145J	Data Mining: Finding the Data and Models that Create Value	F	Second half of term, Sloan bidding process required
15.070J / 6.265J	Advanced Stochastic Processes	S	
15.074J / IDS.213J	Predictive Data Analytics and Statistical Modeling	S	
15.077	Statistical Learning and Data Mining	S	Cannot be used if taken in Fall 2015 or after and credit also received for 6.867
15.082	Network Optimization	F	Sloan bidding process required
15.083J / 6.859J	Integer Programming and Combinatorial Optimization	S	Not offered 2016-17; Sloan bidding process required
15.764J / 1.271J / IDS.155J	Theory of Operations Management	S	
16.110	Flight Vehicle Aerodynamics	F	
16.225J / 2.099J	Computational Mechanics of Materials	F	
16.413	Principles of Autonomy and Decision Making	F	
16.888J / IDS.338J	Multidisciplinary System Design Optimization	S	Not offered 2016-17
16.930	Advanced Topics in Numerical Methods for Partial Differential Equations	S	Not offered 2017-18
16.940	Numerical Methods for Stochastic Modeling & Inference	F	Not offered 2016-17
18.0851	Computational Science and Engineering I	F, S	Cannot be used to satisfy the requirements by students joining CSE Sept 2017 or later
18.0861	Computational Science and Engineering II	S	Cannot be used to satisfy the requirements by students joining CSE Sept 2017 or later
18.336J / 6.335J	Fast Methods for Partial Differential and Integral Equations	F	
18.337J / 6.338J	Parallel Computing	F	
18.369	Mathematical Methods in Nanophotonics	S	Not offered 2016-17
22.107	Computational Nuclear Science and Engineering	S	Not offered 2017-18
22.15	Essential Numerical Methods	F	First half of term
22.212	Nuclear Reactor Analysis II	F	
22.213	Nuclear Reactor Physics III	S	Not offered 2017-18
22.315	Applied Computational Fluid Dynamics and Heat Transfer	S	Not offered 2016-17