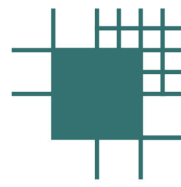


**Doctoral Program in Computational Science and Engineering**

Approved Computational Science and Engineering Subject List

| Subject #                         | Subject Name                                                              | Term (F / S) | Notes |
|-----------------------------------|---------------------------------------------------------------------------|--------------|-------|
| 1.124[J] / 2.091[J]               | Software and Computation for Simulation                                   | F            |       |
| 1.125                             | Architecting & Engineering Software Systems                               | F            |       |
| 1.545                             | Atomistic Modeling & Simulations of Materials & Structures                | F            |       |
| 1.723                             | Computational Methods for Flow in Porous Media                            | S            |       |
| 2.089[J] / 1.128[J]               | Computational Geometry                                                    | S            |       |
| 2.096[J] / 6.336[J] / 16.910[J]   | Introduction to Numerical Simulation                                      | F            |       |
| 2.097[J] / 6.339[J] / 16.920[J]   | Numerical Methods for Partial Differential Equations                      | F            |       |
| 2.098                             | Introduction to Finite Element Methods for Partial Differential Equations | S            |       |
| 2.168                             | Learning Machines                                                         | S            |       |
| 2.29                              | Numerical Fluid Mechanics                                                 | S            |       |
| 3.320                             | Atomistic Computer Modeling of Materials                                  | S            |       |
| 4.450[J] / 1.575[J]               | Computational Structural Design and Optimization                          | F            |       |
| 6.231                             | Dynamic Programming and Stochastic Control                                | S            |       |
| 6.251[J] / 15.081[J]              | Introduction to Mathematical Programming                                  | F            |       |
| 6.252[J] / 15.084[J]              | Nonlinear Optimization                                                    | S            |       |
| 6.255[J] / 15.093[J] / IDS.200[J] | Optimization Methods                                                      | F            |       |
| 6.256                             | Algebraic Techniques and Semidefinite Optimization                        | S            |       |
| 6.265[J] / 15.070[J]              | Advanced Stochastic Processes                                             | S            |       |
| 6.337[J] / 18.335[J]              | Introduction to Numerical Methods                                         | S            |       |
| 6.438                             | Algorithms for Inference                                                  | F            |       |
| 6.439[J] / IDS.131[J]             | Statistics, Computation and Applications                                  | F            |       |
| 6.838                             | Shape Analysis                                                            | S            |       |
| 6.860[J] / 9.520[J]               | Statistical Learning Theory and Applications                              | F            |       |
| 6.864                             | Advanced Natural Language Processing                                      | F            |       |
| 6.867                             | Machine Learning                                                          | F            |       |
| 6.869                             | Advances in Computer Vision                                               | F            |       |
| 9.660                             | Computational Cognitive Science                                           | F            |       |
| 10.557                            | Mixed-integer and Nonconvex Optimization                                  | S            |       |
| 10.637[J] / 5.698[J]              | Quantum Chemical Simulation                                               | F            |       |
| 12.515                            | Data and Models                                                           | F            |       |
| 12.521                            | Computational Geophysical Modeling                                        | S            |       |
| 12.620[J] / 6.946[J] / 8.351[J]   | Classical Mechanics: A Computational Approach                             | F            |       |
| 12.714                            | Computational Data Analysis                                               | S            |       |
| 12.805                            | Data Analysis in Physical Oceanography                                    | S            |       |



**Doctoral Program in Computational Science and Engineering**

Approved Computational Science and Engineering Subject List

| Subject #                         | Subject Name                                                                         | Term (F / S) | Notes                                                                       |
|-----------------------------------|--------------------------------------------------------------------------------------|--------------|-----------------------------------------------------------------------------|
| 12.850                            | Computational Ocean Modeling                                                         | S            |                                                                             |
| 15.077                            | Statistical Learning and Data Mining                                                 | S            | Cannot be used if taken Fall 2015 or after & credit also received for 6.867 |
| 15.083                            | Integer Programming and Combinatorial Optimization                                   | S            | Sloan bidding process required                                              |
| 15.764[J] / 1.271[J] / IDS.155[J] | Theory of Operations Management                                                      | S            |                                                                             |
| 16.110                            | Flight Vehicle Aerodynamics                                                          | F            |                                                                             |
| 16.225[J] / 2.099[J]              | Computational Mechanics of Materials                                                 | S            |                                                                             |
| 16.413                            | Principles of Autonomy and Decision Making                                           | F            |                                                                             |
| 16.888[J] / IDS.338[J]            | Multidisciplinary System Design Optimization                                         | S            |                                                                             |
| 16.930                            | Advanced Topics in Numerical Methods for Partial Differential Equations              | S            |                                                                             |
| 16.940                            | Numerical Methods for Stochastic Modeling & Inference                                | F            |                                                                             |
| 18.336[J] / 6.335[J]              | Fast Methods for Partial Differential and Integral Equations                         | F            |                                                                             |
| 18.337[J] / 6.338[J]              | Numerical Computing and Interactive Software<br><i>[formerly Parallel Computing]</i> | F            |                                                                             |
| 18.369                            | Mathematical Methods in Nanophotonics                                                | S            |                                                                             |
| 22.15                             | Essential Numerical Methods                                                          | F            | First half of term                                                          |
| 22.212                            | Nuclear Reactor Analysis II                                                          | F            |                                                                             |
| 22.213                            | Nuclear Reactor Physics III                                                          | S            |                                                                             |
| 22.315                            | Applied Computational Fluid Dynamics and Heat Transfer                               | S            |                                                                             |

*Previously Approved Subjects No Longer Included*

- 1.204 Computer Modeling: From Human Mobility to Transportation Networks [No longer offered]
- 2.093 Finite Element Analysis of Solids and Fluids I [No longer offered]
- 2.094 Finite Element Analysis of Solids and Fluids II [No longer offered]
- 2.37 Fundamentals of Nanoengineering [Cannot be used if taken Spring 2020 or later]
- 6.581[J] / 20.482[J] Foundations of Algorithms and Computational Techniques in Systems Biology [No longer offered]
- 6.673 Intro to Numerical Simulation in Electrical Engineering [No longer offered]
- 10.34 Numerical Methods Applied to Chemical Engineering [CSE credit for Course 10 students only, Fall 2019 forward]
- 15.062[J] / IDS.145[J] Data Mining [Cannot be used if taken Fall 2019 forward]
- 15.074[J] / IDS.213[J] Predictive Data Analytics and Statistical Modeling [No longer offered]
- 15.082 Network Optimization [No longer offered]
- 18.0851 Computational Science and Engineering I [Cannot be used if taken Fall 2017 or later]
- 18.0861 Computational Science and Engineering II [Cannot be used if taken Fall 2017 or later]
- 22.107 Computational Nuclear Science and Engineering [No longer offered]