INTERDISCIPLINARY DOCTOR OF PHILOSOPHY IN STATISTICS

Interdisciplinary Doctoral Program in Statistics (http://catalog.mit.edu/interdisciplinary/graduate-programs/phd-statistics)

Interdisciplinary PhD in Statistics

Common Core
All students in the Interdisciplinary Doctoral Program in Statistics are required to complete the common core for a total of 27 units.

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.436(J)</td>
<td>Fundamentals of Probability</td>
<td>12</td>
</tr>
<tr>
<td>or 18.675</td>
<td>Theory of Probability</td>
<td></td>
</tr>
<tr>
<td>IDS.190</td>
<td>Doctoral Seminar in Statistics and Data Science</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.6501</td>
<td>Fundamentals of Statistics</td>
<td>12</td>
</tr>
<tr>
<td>18.655</td>
<td>Mathematical Statistics</td>
<td></td>
</tr>
<tr>
<td>IDS.160(J)</td>
<td>Mathematical Statistics: a Non-Asymptotic Approach</td>
<td></td>
</tr>
</tbody>
</table>

Total Units: 27

Program-specific Requirements
Each student must complete the requirements specified by their home department in the lists below by taking one subject from the Computation and Statistics category and one subject from the Data Analysis category.

Aeronautics and Astronautics

Computation and Statistics
Select one of the following: 12

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.438</td>
<td>Algorithms for Inference</td>
<td></td>
</tr>
<tr>
<td>6.867</td>
<td>Machine Learning</td>
<td></td>
</tr>
<tr>
<td>9.520(J)</td>
<td>Statistical Learning Theory and Applications</td>
<td></td>
</tr>
<tr>
<td>16.391(J)</td>
<td>Statistics for Engineers and Scientists</td>
<td></td>
</tr>
<tr>
<td>16.940</td>
<td>Numerical Methods for Stochastic Modeling and Inference</td>
<td></td>
</tr>
</tbody>
</table>

Data Analysis
Select one of the following: 12

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.393</td>
<td>Statistical Communication and Localization Theory</td>
<td></td>
</tr>
<tr>
<td>16.470</td>
<td>Statistical Methods in Experimental Design</td>
<td></td>
</tr>
</tbody>
</table>

Total Units: 24

Economics

Computation and Statistics
Select one of the following: 12

<table>
<thead>
<tr>
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<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.520(J)</td>
<td>Statistical Learning Theory and Applications</td>
<td></td>
</tr>
<tr>
<td>6.867</td>
<td>Machine Learning</td>
<td></td>
</tr>
</tbody>
</table>

Data Analysis

Select one of the following: 12

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.192</td>
<td>Advanced Research and Communication</td>
<td></td>
</tr>
<tr>
<td>14.386</td>
<td>New Econometric Methods</td>
<td></td>
</tr>
<tr>
<td>or 14.387</td>
<td>Applied Econometrics</td>
<td></td>
</tr>
</tbody>
</table>

Total Units: 36

Mathematics

Computation and Statistics
Select one of the following: 12

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.252(J)</td>
<td>Nonlinear Optimization</td>
<td></td>
</tr>
<tr>
<td>6.256(J)</td>
<td>Algebraic Techniques and Semidefinite Optimization</td>
<td></td>
</tr>
<tr>
<td>6.438</td>
<td>Algorithms for Inference</td>
<td></td>
</tr>
<tr>
<td>6.867</td>
<td>Machine Learning</td>
<td></td>
</tr>
</tbody>
</table>

Total Units: 24

1 Mathematics students may not elect 18.6501 (http://student.mit.edu/catalog/search.cgi?search=18.6501).

2 Students may substitute a more advanced subject with permission of the program director.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.520</td>
<td>Statistical Learning Theory and Applications</td>
</tr>
<tr>
<td>18.337</td>
<td>Parallel Computing and Scientific Machine Learning</td>
</tr>
<tr>
<td>18.338</td>
<td>Eigenvalues of Random Matrices</td>
</tr>
<tr>
<td>18.415</td>
<td>Advanced Algorithms</td>
</tr>
<tr>
<td>18.416</td>
<td>Randomized Algorithms</td>
</tr>
<tr>
<td>18.657</td>
<td>Topics in Statistics</td>
</tr>
</tbody>
</table>

### Data Analysis

**Select one of the following:**

- 6.555 Biomedical Signal and Image Processing
- 6.869 Advances in Computer Vision
- 9.073 Statistics for Neuroscience Research
- 9.272 Topics in Neural Signal Processing
- 18.367 Waves and Imaging
- IDS.131 Statistics, Computation and Applications

Total Units: 24

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2 Students may petition to use IDS.160 to fulfill the Computation and Statistics requirement, if not elected as part of the Common Core.

### Mechanical Engineering

#### Computation and Statistics

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.168</td>
<td>Learning Machines</td>
</tr>
<tr>
<td>or 6.860</td>
<td>Statistical Learning Theory and Applications</td>
</tr>
</tbody>
</table>

**Data Analysis**

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>2.122</td>
<td>Stochastic Systems</td>
</tr>
<tr>
<td>or 2.29</td>
<td>Numerical Fluid Mechanics</td>
</tr>
</tbody>
</table>

Total Units: 24

### Physics

#### Computation and Statistics

**Select one of the following:**

- 6.438 Algorithms for Inference
- 6.862 Applied Machine Learning
- 6.864 Advanced Natural Language Processing
- 6.866 Machine Vision
- 6.867 Machine Learning
- 6.883 Advanced Topics in Artificial Intelligence
- 6.874 Computational Systems Biology: Deep Learning in the Life Sciences
- 9.520 Statistical Learning Theory and Applications

16.940 Numerical Methods for Stochastic Modeling and Inference

18.337 Parallel Computing and Scientific Machine Learning

### Data Analysis

**Select one of the following:**

- 6.869 Advances in Computer Vision
- 8.334 Statistical Mechanics II
- 8.371 Quantum Information Science
- 8.591 Systems Biology
- 8.592 Statistical Physics in Biology
- 8.942 Cosmology
- 9.583 Functional Magnetic Resonance Imaging: Data Acquisition and Analysis

18.367 Waves and Imaging

IDS.131 Statistics, Computation and Applications

Total Units: 24

### Political Science

#### Computation and Statistics

**Select one of the following:**

- 6.867 Machine Learning
- 9.520 Statistical Learning Theory and Applications
- 14.381 Applied Econometrics

**Data Analysis**

**Select one of the following:**

- 17.802 Quantitative Research Methods II: Causal Inference
- 17.804 Quantitative Research Methods III: Generalized Linear Models and Extensions
- 17.806 Quantitative Research Methods IV: Advanced Topics

Total Units: 24

### Social and Engineering Systems

#### Computation and Statistics

**Select one of the following:**

- 6.434 Statistics for Engineers and Scientists
- 6.438 Algorithms for Inference
- 6.867 Machine Learning
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<tbody>
<tr>
<td>9.520[J]</td>
<td>Statistical Learning Theory and Applications</td>
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<tr>
<td>14.381</td>
<td>Applied Econometrics</td>
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<tr>
<td>14.382</td>
<td>Econometrics</td>
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<tr>
<td>15.077[J]</td>
<td>Statistical Machine Learning and Data Science</td>
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<tr>
<td>17.802</td>
<td>Quantitative Research Methods II: Causal Inference</td>
</tr>
<tr>
<td>17.804</td>
<td>Quantitative Research Methods III: Generalized Linear Models and Extensions</td>
</tr>
<tr>
<td>17.806</td>
<td>Quantitative Research Methods IV: Advanced Topics</td>
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**Data Analysis**

Select one of the following: 12-15

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<td>6.869</td>
<td>Advances in Computer Vision</td>
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<td>9.272[J]</td>
<td>Topics in Neural Signal Processing</td>
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<tr>
<td>18.367</td>
<td>Waves and Imaging</td>
</tr>
<tr>
<td>IDS.131[J]</td>
<td>Statistics, Computation and Applications</td>
</tr>
</tbody>
</table>

**Total Units** 24-27