COMPUTATION AND COGNITION (COURSE 6-9P)

Computation and Cognition (http://catalog.mit.edu/interdisciplinary/graduate-programs/computation-cognition)

Master of Engineering in Computation and Cognition

The Master of Engineering degree is awarded only to students who have already received, or who will simultaneously receive, the Bachelor of Science in Computation and Cognition (Course 6-9). Refer to the undergraduate degree chart (http://catalog.mit.edu/degree-charts/computation-cognition-6-9) for requirements.

The graduate component of the MEng program is described below.

Course 6-9P Graduate Requirements

Required Subjects

6.THM Master of Engineering Program Thesis 24

Restricted Electives

Four graduate subjects totaling at least 42 units, which includes two subjects from the EECS advanced subjects and two from the BCS advanced subjects 42-48

Two subjects from the list of mathematics restricted electives 24

Total Units 90-96

EECS Advanced Subjects

6.231 Dynamic Programming and Reinforcement Learning 12
6.245 Multivariable Control Systems 12
6.246, 6.247 Advanced Topics in Control 12
6.248, 6.249 Advanced Topics in Numerical Methods 12
6.251[J] Introduction to Mathematical Programming 12
6.252[J] Nonlinear Optimization 12
6.254 Game Theory with Engineering Applications 12
6.256[J] Algebraic Techniques and Semidefinite Optimization 12
6.260, 6.261 Advanced Topics in Communications 12
6.262 Discrete Stochastic Processes 12
6.263[J] Data-Communication Networks 12
6.267 Heterogeneous Networks: Architecture, Transport, Protocols, and Management 12
6.268 Network Science and Models 12
6.332, 6.333 Advanced Topics in Circuits 12
6.334 Power Electronics 12
6.336[J] Introduction to Modeling and Simulation 12
6.337[J] Introduction to Numerical Methods 12
6.338[J] Parallel Computing and Scientific Machine Learning 12
6.341 Discrete-Time Signal Processing 12
6.344 Digital Image Processing 12
6.345[J] Spoken Language Processing 12
6.347, 6.348 Advanced Topics in Signals and Systems 12
6.375 Complex Digital Systems Design 12
6.434[J] Statistics for Engineers and Scientists 12
6.435 Bayesian Modeling and Inference 12
6.437 Inference and Information 12
6.438 Algorithms for Inference 12
6.440 Essential Coding Theory 12
6.441 Information Theory 12
6.442 Optical Networks 12
6.443[J] Quantum Information Science 12
6.450 Principles of Digital Communication 12
6.452 Principles of Wireless Communication 12
6.454 Graduate Seminar in Area I 6
6.456 Array Processing 12
6.521[J] Cellular Neurophysiology and Computing 1
6.524[J] Molecular, Cellular, and Tissue Biomechanics 12
6.525[J] Medical Device Design 12
6.542[J] Laboratory on the Physiology, Acoustics, and Perception of Speech 12
6.544, 6.545 Advanced Topics in BioEECS 12
6.555[J] Biomedical Signal and Image Processing
6.556[J] Data Acquisition and Image Reconstruction in MRI
6.630 Electromagnetics
6.631 Optics and Photonics
6.632 Electromagnetic Wave Theory
6.637 Optical Imaging Devices, and Systems
6.644 Advanced Topics in Applied Physics
6.645 Advanced Topics in Applied Physics
6.685 Electric Machines
6.690 Introduction to Electric Power Systems
6.695[J] Engineering, Economics and Regulation of the Electric Power Sector
6.719 Nanoelectronics
6.720[J] Integrated Microelectronic Devices
6.728 Applied Quantum and Statistical Physics
6.730 Physics for Solid-State Applications
6.731 Semiconductor Optoelectronics: Theory and Design
6.732 Physics of Solids
6.735, 6.736 Advanced Topics in Materials, Devices, and Nanotechnology
6.774 Physics of Microfabrication: Front End Processing
6.776 High Speed Communication Circuits
6.777[J] Design and Fabrication of Microelectromechanical Systems
6.780[J] Control of Manufacturing Processes
6.781[J] Nanostructure Fabrication
6.820 Foundations of Program Analysis
6.823 Computer System Architecture
6.824 Distributed Computer Systems Engineering
6.828 Operating System Engineering
6.829 Computer Networks
6.830 Database Systems
6.832 Underactuated Robotics
6.833 The Human Intelligence Enterprise
6.834[J] Cognitive Robotics
6.835 Intelligent Multimodal User Interfaces
6.836 Multicore Programming
6.837 Computer Graphics
6.838 Shape Analysis
6.839 Advanced Computer Graphics
6.841[J] Advanced Complexity Theory
6.842 Randomness and Computation
6.845 Quantum Complexity Theory
6.846 Parallel Computing
6.849 Geometric Folding Algorithms: Linkages, Origami, Polyhedra
6.850 Geometric Computing
6.851 Advanced Data Structures
6.852[J] Distributed Algorithms
6.853 Topics in Algorithmic Game Theory
6.856[J] Randomized Algorithms
6.857 Network and Computer Security
6.858 Computer Systems Security
6.860[J] Statistical Learning Theory and Applications
6.863[J] Natural Language and the Computer Representation of Knowledge
6.864 Advanced Natural Language Processing
6.865 Advanced Computational Photography
6.866 Machine Vision
6.867 Machine Learning
6.869 Advances in Computer Vision
6.870 Advanced Topics in Computer Vision
6.875[J] Cryptography and Cryptanalysis
6.876 Advanced Topics in Cryptography
6.881 Advanced Topics in Artificial Intelligence (6.882, 6.883, 6.884)
6.885 Advanced Topics in Computer Systems (6.886, 6.887, 6.888)
6.894 Advanced Topics in Graphics and Human-Computer Interfaces
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.945</td>
<td>Large-scale Symbolic Systems</td>
<td>12</td>
</tr>
</tbody>
</table>

1 Cannot count as EECS Advanced Subject if undergraduate version is taken as part of the Course 6-9 SB degree.

**BCS Advanced Subjects**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.016[J]</td>
<td>Introduction to Sound, Speech, and Hearing</td>
<td>12</td>
</tr>
<tr>
<td>9.110[J]</td>
<td>Nonlinear Control</td>
<td>12</td>
</tr>
<tr>
<td>9.181[J]</td>
<td>Developmental Neurobiology 1</td>
<td>12</td>
</tr>
<tr>
<td>9.190</td>
<td>Computational Psycholinguistics 1</td>
<td>12</td>
</tr>
<tr>
<td>9.272[J]</td>
<td>Topics in Neural Signal Processing</td>
<td>12</td>
</tr>
<tr>
<td>9.301[J]</td>
<td>Neural Plasticity in Learning and Memory</td>
<td>9</td>
</tr>
<tr>
<td>9.34[J]</td>
<td>Biomechanics and Neural Control of Movement</td>
<td>12</td>
</tr>
<tr>
<td>9.422[J]</td>
<td>Principles of Neuroengineering</td>
<td>12</td>
</tr>
<tr>
<td>9.455[J]</td>
<td>Revolutionary Ventures: How to Invent and Deploy Transformative Technologies</td>
<td>9</td>
</tr>
<tr>
<td>9.520[J]</td>
<td>Statistical Learning Theory and Applications 1</td>
<td>12</td>
</tr>
<tr>
<td>9.530</td>
<td>Emergent Computations Within Distributed Neural Circuits 1</td>
<td>12</td>
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<tr>
<td>9.660</td>
<td>Computational Cognitive Science 1</td>
<td>12</td>
</tr>
<tr>
<td>9.822[J]</td>
<td>Psychology and Economics</td>
<td>12</td>
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<tr>
<td>24.949</td>
<td>Language Acquisition I</td>
<td>9</td>
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</tbody>
</table>

1 Cannot count as BCS Advanced Subject if undergraduate version is taken as part of the Course 6-9 SB degree.

2 Subject can count as BCS Advanced Subject or Mathematics Restricted Elective, but not both.

**Discrete Mathematics (maximum of 1)**

<table>
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<th>Units</th>
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<tbody>
<tr>
<td>6.042[J]</td>
<td>Mathematics for Computer Science 1</td>
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<tr>
<td>18.200</td>
<td>Principles of Discrete Applied Mathematics</td>
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**Linear Algebra (maximum of 1)**

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>18.06</td>
<td>Linear Algebra 1</td>
<td></td>
</tr>
<tr>
<td>18.703</td>
<td>Modern Algebra</td>
<td></td>
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</table>

**Complex Variables (maximum of 1)**

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>18.04</td>
<td>Complex Variables with Applications</td>
<td></td>
</tr>
<tr>
<td>18.0751</td>
<td>Methods for Scientists and Engineers</td>
<td></td>
</tr>
</tbody>
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**Real Analysis (maximum of 1)**

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<tr>
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<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.1001</td>
<td>Real Analysis</td>
<td></td>
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</table>

**Other Subjects**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>8.044</td>
<td>Statistical Physics I</td>
<td></td>
</tr>
<tr>
<td>18.0851</td>
<td>Computational Science and Engineering I</td>
<td></td>
</tr>
<tr>
<td>18.0861</td>
<td>Computational Science and Engineering II</td>
<td></td>
</tr>
<tr>
<td>18.330</td>
<td>Introduction to Numerical Analysis</td>
<td></td>
</tr>
<tr>
<td>18.781</td>
<td>Theory of Numbers</td>
<td></td>
</tr>
</tbody>
</table>

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**Mathematics Restricted Electives**

**Probability and Statistics (maximum of 1)**

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.008</td>
<td>Introduction to Inference 1</td>
<td></td>
</tr>
</tbody>
</table>