# CS 3510: Advanced Algorithms/Data Structures

## Spring 2019 Schedule

*TO BE UPDATED BELOW HERE*

<table>
<thead>
<tr>
<th>Day</th>
<th>Topic</th>
<th>Reading</th>
<th>Work Due</th>
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<tbody>
<tr>
<td>Jan 8</td>
<td>Course introduction, algorithms, complexity</td>
<td>Ch 0</td>
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<tr>
<td>Jan 10</td>
<td>Experimental measurement of algorithms</td>
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<tr>
<td>Jan 12</td>
<td>Experimental measurement of algorithms</td>
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<tr>
<td>Jan 15</td>
<td><em>Martin Luther King Jr. Day</em> (no classes)</td>
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<tr>
<td>Jan 17</td>
<td>Arithmetic algorithms</td>
<td>Ch 1.1</td>
<td>Chapter 0</td>
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<tr>
<td>Jan 19</td>
<td>Modular arithmetic algorithms</td>
<td>Ch 1.2</td>
<td>Chapter 1</td>
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<tr>
<td>Jan 22</td>
<td>Modular arithmetic algorithms</td>
<td>Ch 1.2</td>
<td>Chapter 1</td>
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<tr>
<td>Jan 24</td>
<td>Modular arithmetic algorithms</td>
<td>Ch 1.2</td>
<td>Chapter 1</td>
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<tr>
<td>Jan 26</td>
<td>Primality algorithms</td>
<td>Ch 1.3</td>
<td>Chapter 1</td>
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<tr>
<td>Jan 29</td>
<td>RSA cryptography algorithms</td>
<td>Ch 1.4</td>
<td>Chapter 1</td>
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<td>Jan 31</td>
<td>RSA cryptography algorithms</td>
<td>Ch 1.4</td>
<td>Chapter 1</td>
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<tr>
<td>Feb  2</td>
<td>Divide and conquer, multiplication, Recurrence relations</td>
<td>Ch 2.1, 2.2</td>
<td>Chapter 2</td>
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<tr>
<td>Feb  5</td>
<td>Mergesort, selection</td>
<td>Ch 2.3, 2.4</td>
<td>Chapter 2</td>
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<tr>
<td>Feb  7</td>
<td>Mergesort, selection</td>
<td>Ch 2.3, 2.4</td>
<td>Chapter 2</td>
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<tr>
<td>Feb  9</td>
<td>Matrix multiplication, Closest Pair</td>
<td>Ch 2.5, 2</td>
<td>Chapter 2</td>
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<tr>
<td>Feb 12</td>
<td>Graphs and representations</td>
<td>Ch 3.1</td>
<td>Chapter 2</td>
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<tr>
<td>Feb 14</td>
<td>Graphs and representations</td>
<td>Ch 3.1</td>
<td>Chapter 2</td>
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<tr>
<td>Feb 16</td>
<td>Depth first search and connectivity, Directed graph search</td>
<td>Ch 3.2, 3.3</td>
<td>Chapter 2</td>
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<tr>
<td>Feb 19</td>
<td><em>President’s Day Holiday</em> (no classes)</td>
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<tr>
<td>Feb 19</td>
<td>Binary Heaps</td>
<td>Ch 4.5</td>
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<tr>
<td>Feb 21</td>
<td>Breadth-first Search, Dijkstra’s Algorithm</td>
<td>Ch 4.1-4.4</td>
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<tr>
<td>Feb 26</td>
<td>Shortest Paths with Negative Edges</td>
<td>Ch 4.6</td>
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<tr>
<td>Feb 28</td>
<td>Shortest Paths with DAGs - Greedy</td>
<td>Ch 4.7, 5</td>
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<tr>
<td>Mar  5</td>
<td>Trees, Cut Property, Prim’s Algorithm</td>
<td>Ch 5.1-(1,2,5)</td>
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<tr>
<td>Mar  7</td>
<td>Kruskal’s Algorithm, Disjoint Sets</td>
<td>Ch 5.1, 3, 5.1.4</td>
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<tr>
<td>Mar 19</td>
<td>Huffman encoding, Horn Formulas</td>
<td>Ch 5.2, 3</td>
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<tr>
<td>Mar 21</td>
<td>Set Cover</td>
<td>Ch 5.4</td>
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<tr>
<td>Mar 26</td>
<td>D.A.G, Longest Subsequence, Edit Distance</td>
<td>Ch 6.1, 2, 3</td>
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<td>Mar 28</td>
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<tr>
<td>Apr  2</td>
<td>Knapsack</td>
<td>Ch 6.5</td>
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<td>Apr  4</td>
<td>Traveling Salesman</td>
<td>Ch 6.6</td>
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<tr>
<td>Apr  9</td>
<td>Review</td>
<td>Ch 4.5, 6</td>
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<td>Apr 11</td>
<td>Exam 2</td>
<td>Ch 4.5, 6</td>
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<tr>
<td>Apr 11</td>
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<td>Ch 7</td>
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<td>Apr 16</td>
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<td>Ch 8</td>
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<td>Apr 18</td>
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<td>Ch 9</td>
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<tr>
<td>Apr 23</td>
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<td>Ch 7, 8, 9</td>
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<tr>
<td>Apr 30</td>
<td><strong>Final Exam (9:00-10:50)</strong></td>
<td>Ch 0, 2, 3, 4, 5, 6, 7, 8, 9</td>
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<td>Feb 20-25</td>
<td><em>Examination I</em></td>
<td>Ch 0, 1, 2</td>
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<tr>
<td>Feb 21</td>
<td>Strongly connected components</td>
<td>Ch 3.4</td>
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<tr>
<td>Feb 23</td>
<td>Paths, distances, breadth first search, Dijkstra’s algorithm for shortest paths</td>
<td>Ch 4.1-4.4</td>
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<tr>
<td>Feb 26</td>
<td>Paths with negative edges, paths in DAGS</td>
<td>Ch 4.6, 4.7</td>
<td>Chapter 3</td>
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<td>Feb 28</td>
<td>Paths with negative edges, paths in DAGS</td>
<td>Ch 4.6, 4.7</td>
<td>Chapter 3</td>
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<td>Mar  2</td>
<td>Arrays vs. heaps for priority queues</td>
<td>Ch 4.5</td>
<td>Chapter 3</td>
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<td>Mar  5</td>
<td>Trees, minimum spanning trees, Cut property and Kruskal’s</td>
<td>Ch 5.1</td>
<td>Chapter 3</td>
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<tr>
<td>Date</td>
<td>Topic</td>
<td>Chapter(s)</td>
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<tr>
<td>Mar 5</td>
<td>algorithm for MST</td>
<td>Ch 3.1</td>
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<td>Mar 7</td>
<td>Trees, minimum spanning trees, Cut property and Kruskal’s algorithm for MST</td>
<td>Ch 5.1</td>
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<td>Mar 9</td>
<td>Disjoint sets and amortized analysis</td>
<td>Ch 5.1</td>
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<td>Mar 12-16</td>
<td><em>Spring Break (no classes)</em></td>
<td>Ch 5.1, 4</td>
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<td>Prim’s algorithm for MST, Huffman encoding</td>
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<td>Mar 21</td>
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<td>Mar 23</td>
<td>SAT algorithm with horn formulas, Set cover</td>
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<td>Mar 26</td>
<td>Shortest paths in DAGs (again), Longest increasing subsequence</td>
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<td>Mar 28</td>
<td>Shortest paths in DAGs (again), Longest increasing subsequence</td>
<td>Ch 6.1, 6.2</td>
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<td>Mar 30</td>
<td>Edit distance</td>
<td>Ch 3.4, 5</td>
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<td>Apr 2-8</td>
<td><strong>Examination II</strong></td>
<td>Ch 3.4, 5</td>
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<td>Apr 2</td>
<td>Quiz Review</td>
<td>Ch 6.3</td>
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<td>Apr 6</td>
<td>Knapsack, Chain matrix multiplication</td>
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<td>All pairs shortest paths</td>
<td>Ch 6.6</td>
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<td>Apr 11</td>
<td>All pairs shortest paths</td>
<td>Ch 6.6</td>
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<td>Apr 13</td>
<td>Traveling sales person, Practical programming with dynamic programming</td>
<td>Ch 6.6</td>
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<td>Apr 16</td>
<td>Linear programming, Duality</td>
<td>Ch 7.1, 7.4</td>
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<td>Apr 18</td>
<td>Linear programming, Duality</td>
<td>Ch 7.1, 7.4</td>
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<tr>
<td>Apr 20</td>
<td>Simplex, NP-complete problems and dealing with them</td>
<td>Ch 7.6, 8.9</td>
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<tr>
<td>Apr 23</td>
<td>Review/Quiz</td>
<td>Ch 0-7</td>
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<tr>
<td>Apr 25</td>
<td>Review/Quiz</td>
<td>Ch 0-7</td>
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<td>Apr 26</td>
<td>Reading Day</td>
<td>Ch 0-7</td>
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<td>Apr 30</td>
<td>Final Exam 7:00 am - 8:50 am</td>
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Class announcements may modify schedule from that listed above.