

<b>Course #:</b>	<b>CSCI-C 243</b>
<b>Course Title:</b>	<b>Introduction to Data Structures</b>
<b>Course Type:</b>	Required core
<b>Prerequisites:</b>	C151 Multi-user Operating Systems, C201 Computer Programming II
<b>Credits:</b>	4
<b>Text Book:</b>	Data Structures and Algorithm Analysis in C++, 3rd edition, by M. A. Weiss
<b>References:</b>	Class notes by Knight, Vrajitoru and Surma
<b>Current Catalog Description:</b>	Abstract data types and their implementations using various data structures and algorithms; elementary algorithm analysis; space/time trade-offs; sorting and searching; finite graph algorithms; introduction to object oriented design and programming; software engineering principles.
<b>Course Goals</b>	<p>The student who completes this course:</p> <ol style="list-style-type: none"> <li>1. Will be familiarized with the major data structures (trees, hash trees, priority queues, etc.)</li> <li>2. Will have proficiency in algorithms that manipulate various data structures.</li> <li>3. Will have the ability to measure and analyze time and space complexity of a given algorithm.</li> <li>4. Will be familiarized with various sort and search algorithms.</li> <li>5. Will have the programming and theoretical foundations for developing software application.</li> <li>6. Will have further enhanced, and developed programming skills.</li> </ol>
<b>Major Topics Covered in the Course</b>	<ol style="list-style-type: none"> <li>1. Performance issues; analysis of algorithms; big-oh notation.</li> <li>2. Tables (associative container classes); implementations.</li> <li>3. Binary trees; recursion</li> <li>4. Binary search trees; AVL trees; red/black trees.</li> <li>5. Hash tables.</li> <li>6. Priority queues; binary heaps.</li> <li>7. Collection of disjoint sets; union/find operations.</li> <li>8. Sorting concepts; in-place sorts; stable sorts; internal sorts</li> <li>9. Selection sorts: Straight Selection and Heap Sort</li> <li>10. Exchange sorts: Bubble Sort and Quicksort</li> <li>11. Insertion sorts: Linear Insertion Sort, Binary Insertion Sort</li> <li>12. Merge Sort; Bucket Sort</li> </ol>

	13. Sorting linked lists 14. The Standard Template Library 15. Graph Theory, Graph Traversal, Minimum Spanning Tree																		
<b>Laboratory projects (specify number of weeks on each)</b>	No closed laboratory																		
<b>Estimate Curriculum Category Content (Semester hours)</b>	<table border="1"> <thead> <tr> <th>Area</th> <th>Core</th> <th>Advanced</th> </tr> </thead> <tbody> <tr> <td>Algorithms</td> <td>10</td> <td>5</td> </tr> <tr> <td>Software Design</td> <td>13</td> <td>6</td> </tr> <tr> <td>Comp. Arch.</td> <td></td> <td></td> </tr> <tr> <td>Data Structures</td> <td>26</td> <td>8</td> </tr> <tr> <td>Prog. Languages</td> <td></td> <td></td> </tr> </tbody> </table> <p>Additional hours may be dedicated to curriculum categories not listed above. For example explanation of concepts and theories. Discussion of social and ethical issues, discussion of inter personal relationships and working within groups.</p>	Area	Core	Advanced	Algorithms	10	5	Software Design	13	6	Comp. Arch.			Data Structures	26	8	Prog. Languages		
Area	Core	Advanced																	
Algorithms	10	5																	
Software Design	13	6																	
Comp. Arch.																			
Data Structures	26	8																	
Prog. Languages																			
<b>Oral and Written Communications</b>	Not an objective for this course.																		
<b>Social and Ethical Issues</b>	Not an objective for this course.																		
<b>Theoretical Content</b>	Introduction to analysis of algorithms complexity, 5 hours.																		
<b>Problem Analysis</b>	Homework assignments involved applications for the various data structures thus we had to analyze the problem, devise a solution, and analyze the best use of the data structure for that problem.																		
<b>Solution Design</b>	Homework assignments require the students to analyze the best use of the data structure for the problem and devise a solution.																		
<b>Prepared By</b>	Vrajitoru, Surma																		