Subject Description Form

Subject Code	COMP5112
Subject Title	Data Structures and Database Systems
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	The objectives of this subject are to: 1. apply data structures, sorting and searching algorithms in developing computer programs; 2. use and administrate a database system properly.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. demonstrate a comprehensive understanding of data structures, sorting and searching algorithms; b. apply database systems and the associated tools in real-life problems; c. apply the principles and practices of good database design and analysis in real-life problems.
Subject Synopsis/ Indicative Syllabus	**1. Data structures: representation and algorithms** Linear structures: linked-lists, stacks, queues; tree structures: binary trees, balanced trees, tree traversals; other common data structures: priority queues, heaps. **2. Sorting and searching algorithms** Common sorting algorithms: bubble sort, insertion sort, selection sort, quick sort, merge sort, heap sort. **3. Basic concepts of database system** Database and its applications; DBMS design objectives and its components; data independence. **4. Relational data model** Relational structure; relational algebra; SQL; relational constraints. **5. Database design** Entity-relationship model; functional dependencies; normalization. **6. Data storage and querying** File organization; indexing and hashing; query processing.
Teaching/Learning Methodology	This subject emphasizes the technical aspects of data structures and practical aspects of database systems. It is intended to equip the student with knowledge and experience on solving real-life problems by using data structures and database systems. The lectures will be used to deliver course material. Labs and tutorials will be used to practice exercises.

<table>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="3">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td></tr>
<tr><td>1. Quizzes and Assignments</td><td>55</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Exam</td><td>45</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100</td><td colspan="3"></td></tr>
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<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture</td><td>26 Hrs.</td></tr>
<tr><td>▪ Tutorial/Lab</td><td>13 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Assignments, reading book chapters</td><td>66 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>105 Hrs.</td></tr>
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<tr><td>Reading List and References</td><td>
1. Frank M. Carrano, Data Abstraction & Problem Solving with C++: Walls & Mirrors, 7th Edition, Pearson, 2017.

2. Goodrich, M.T. and Tamassia, R., Data Structures and Algorithms in Java, 6th Edition, John Wiley, 2014.

3. A Silberschatz, H.F. Korth, S. Sudarshan. Database System Concepts 6th Edition. McGraw Hill, 2011.

4. Hector Garcia-Molina, Jeffrey D. Ullman & Jennifer Widom. Database System Implementation, Prentice Hall, 3rd Edition, 2008.
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