Subject Description Form

Subject Code	COMP2011
Subject Title	Data Structures
Credit Value	3
Level	2
Pre-requisite / Co-requisite / Exclusion	**Pre-requisite**: COMP1011
Objectives	The objectives of this subject are to: 1. introduce students to basic concepts of data structures and algorithms; and 2. teach students to apply simple data structures and algorithms in developing computer programs.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) understand the properties of basic data structures; (b) identify the strengths and weaknesses of different data structures; (c) acquire specialised knowledge of various typical algorithms; (d) design and employ appropriate data structures and algorithms for developing computer applications; and (e) think critically for improvement in the solutions.
Subject Synopsis/ Indicative Syllabus	**Topic** **1. Programming and Algorithms** Computer algorithms; types of algorithms; data structures; and abstract data types. **2. Data Structures: Representation and Algorithms** Linear structures: linked-lists, stacks, queues; tree structures: binary trees, balanced trees, tree traversals; and other common data structures: priority queues, heaps. **3. Sorting** Basic sorting algorithms: bubble sort, insertion sort, selection sort; and advanced sorting algorithms: quicksort, mergesort, heapsort. **4. Searching** Common searching algorithms: sequential search, binary search; and advanced searching algorithms: tree search, dictionary and hashing.

5. Applications

Practical program development using combination of various data structures and algorithms, e.g., friends-book; and efficiency of the various approaches.

Teaching/ Learning Methodology

The course material will be delivered as a combination of mass lectures and small group supervised tutorial and laboratory sessions. Lectures will provide the required knowledge while tutorials and laboratory sessions allow students to acquire hands-on experience on programming with different algorithms. Programming project provides students with a chance to integrate their knowledge on applying appropriate data structures and algorithms to solve practical problems.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
Continuous Assessment	**60%**					
1. Laboratory Exercises	20%	✓		✓	✓	
2. Programming Project	20%	✓	✓	✓	✓	✓
3. Test	20%	✓	✓	✓	✓	
Examination	**40%**	✓	✓	✓	✓	✓
Total	100%					

Student Study Effort Expected

Class contact:	
▪ Lecture	39 Hrs.
▪ Tutorial/Lab	13 Hrs.
Other student study effort:	
▪ Assignments, Quizzes, Projects, Self-study	55 Hrs.
Total student study effort	107 Hrs.

Reading List and References

Reference Books:

1. Goodrich, Michael T., Tamassia, Roberto, and Goldwasser, Michael H., *Data Structures and Algorithms in Java*, 6th Edition, Wiley, 2014.
2. Sedgewick, Robert and Wayne, Kevin, *Algorithms*, 4th Edition, Addison-Wesley, 2011.
3. Cormen, Thomas H., Leiserson, Charles E., Rivest, Ronald L. and Stein, Clifford, *Introduction to Algorithms*, 3rd Edition, MIT Press, 2009.