COURSE OUTLINE

Department & Faculty: Dept. of Software Engineering, Faculty of Computing	Page : 1 of 5
Course Code: MCSS1023 Course Name : Advanced Data Structures and Algorithms Total Contact Hours: 42 hours Course Pre-requisite: Data Structures and Algorithms (SCSJ 2013)	Semester: II Academic Session: 2016/2017

Lecturer	:	**Dayang Norhayati Abang Jawawi & NOR BAHIAH AHMAD Software Engineering Department, Faculty of Science Computer & Information System Universiti Teknologi Malaysia, Skudai**
Room No.	:	**305-03, FSKSM, UTM**
Telephone No.	:	**07-5532009**
E-mail	:	**dayang@utm.my bahiah@utm.my**
Synopsis	:	This course provides a solid or advanced understanding to theory and practice of data structure and the study of algorithms analysis. Students will learn the most common data structures and the advanced concepts of the data structure such as B-trees, heaps and priority queues. Further, students will be exposed to the techniques used in the development and analysis of data structures and its algorithms. The analytical abilities of the students in this course are to analyze the performance of data structures and algorithms. At the end of the course, students should be able to implement and apply the theory and concepts of the advanced data structure in assignments.

LEARNING OUTCOMES

By the end of the course, students should be able to:

No.	Course Learning Outcome	Programme Learning Outcome(s) Addressed	Assessment Methods
1.	Describe and apply advanced data structures and algorithms design techniques to solve computational problems.	PO1 (C3, A2, P1)	Q, A, T
2.	Design and implement simple programs in an object-oriented language demonstrating the use of the advanced data structure concepts.	PO2 (C5, P4, A2) PO3 (CTPS2, CTPS3).	A, LB
3.	Analyze the complexity of algorithms and the performance of the algorithms and data structure.	PO1 (C4, P2, A3),	T, F

Prepared by:	Certified by: (Course Panel Head)
Name: Dayang Norhayati Abang Jawawi Signature: Date: 30 Mei 2011	Name: Signature: Date:

COURSE OUTLINE

Department & Faculty: Dept. of Software Engineering, Faculty of Computer Science & Information Systems	Page : 2 of 5
Course Code: MCS 1023 Course Name : Advanced Data Structures and Algorithms Total Contact Hours: 56 hours Course Pre-requisite: Data Structures and Algorithms (SCJ 2013)	Semester: II Academic Session: 2016/2017
((T – Test ; Q – Quiz;A – Assignment; LB – Lab; F – Final Exam)	

STUDENT LEARNING TIME

Teaching and Learning Activities			Student Learning Time (hours)	
Face to face Learning	• Lecturer Centered	Lecture	24	
	• Student Centered	- Practical/Lab/Tutorial	13	
		- Student Centered Activity	5	
	• Others		0	
		Sub Total		42
Self Learning	• Non Face to face or Student Centered Learning (SCL)		34	
	• Revision		14	
	• Assessment Preparation		20	
	• Others		0	
		Sub Total		68
Formal Assessment	• Continuous Assessment		7	
	• Final Examination		3	
	• Others		0	
		Sub Total		10
		TOTAL SLT		**120**

TEACHING METHODOLOGY

E-learning, Lecture and Discussion, Lab Activities, Co-operative Learning, Mini Project, Presentation, Independent Study

COURSE OUTLINE

Department & Faculty: Dept. of Software Engineering, Faculty of Computer Science & Information Systems	**Page : 3 of 5**
Course Code: MCS 1023 **Course Name : Advanced Data Structures and Algorithms** **Total Contact Hours: 56 hours** **Course Pre-requisite: Data Structures and Algorithms (SCJ 2013)**	**Semester: II** **Academic Session: 2016/2017**

WEEKLY SCHEDULE

Week		Topic	Activities/hours
Week 1-2 **(14 & 21 Feb 2017)** **Dr. Dayang**		**1.0 Data Structure** 1.1 Problem Solving 1.2 Types of Data Structure 1.3 Data Structure Applications	Lecture : 4 hours Tutorial : 2 hours Assessment: Nil
Week 3 **(28 Feb 2017)** **Dr. Dayang**	:	2.0 **Algorithm Complexity Analysis** 2.1 Big-O Notation 2.2 The best, average and worst cases 2.3 Amortized complexity 2.4 NP-Completeness, NP-hard 2.5 Recurrence equation	Student Centred learning : 2 hour Tutorial: 1 hour Assessment: Nil
Week 4-6 **(07, 14 & 21 Feb 2017)** **Dr. Bahiah**		3.0 **Search Structures** 4.0 Binary Search Tree 4.1 AVL Trees 4.2 Splay Trees 4.3 B-Trees	Lecture : 6 hours Lab Activity : 3 hours Assessment: Nil Assessment: **Quiz 1** **Assessment:** Assignment 1
Week 7 **(28 Feb 2017)** **Dr. Dayang**		**5.0 Hashing** 5.1 Hash function 5.2 Seperate chaining	Lecture : 2 hours Lab Activity : 1 hours
Week 8 **(04 Mar 2017)**		**SEMESTER BREAK**	
Week 9 **(11 Apr 2017)** **Dr, Dayang**		**5.0 Hashing** 5.3 Open Addressing 5.4 Rehashing	Lecture : 1 hours Lab Activity : 2 hours Assessment: Test 1
Week 10-11 **(18 &25 Mar 2017)** **Dr, Dayang**	:	**6.0 Heap Structures** 6.1 Nim-max heaps, Binomial heaps, 6.2 Fibonacci heaps, skew heaps 6.3 Algorithms 6.4 Application 6.5 Binomial Queues	Lecture : 2 hours Lab Activity : 2 hour Student Centred learning : 2 hour

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Week 12 (02 May 2017) Dr. Norbahiah		**6.0 Advanced Sorting** 6.1 Indirect Sorting 6.2 A general lower bund for sorting 6.3 Bucket Sort 6.4 External Sorting	Lecture : 4 hours Lab Activity : 2 hours
Week 13 & 14 09 & 16 May 2017) Dr. Norbahiah	:	**8.0 Graph Algorithms** 8.1 Terminology 8.2 Operations 8.3 Storage 8.4 Algorithms 8.5 Networks	Lecture : 4 hours Lab Activity : 2 hours Assessment: **Quiz** 2 **Assessment:** Assignment 2
Week 15(23 May 2017)		**Assignment2 Presentation**	Student Centred learning : 3 hours Assessment: Assignment 2 Submission and presentation
Week 16		**STUDY WEEK**	
Week 17		**EXAMINATION WEEK**	Assessment: **Final Exam**

REFERENCES

1. Weiss M. A., "Data Structures and Algorithm Analysis in C++" (Third Edition), Addison-Wesley, 2007.
2. Richrd F. Gilberg and Behrouz A. Forouzan, "*Data Structures A Pseudocode Approach With C++*", Brooks/Cole Thomson Learning, 2001.
3. Frank M Carano, "Data Abstraction and Problem Solving with C++", Walls and Mirrors, Prentice Hall, 2007.
4. Drozdek, A., "Data Structures and Algorithms in C++", 3rd Edition, Course Technology, 2005.
5. Michael T. Goodrich, Roberto Tamassia David M. Mount, "Data Structures and Algorithms in C++", 2nd Edition, 2011

GRADING

No.	Assessment	Number	% each	% total
1	Assignments	2	10%	20
2	Quizzes	2	5%	10
3	Test 1	1	20%	20
4	Lab Exercises or tutorial (Problem solving)	6	2.5%	15
4	Final Exam	1	40%	35
	Overall Total			**100**