



**Course Information Form (QA0-1)**

Code	ITCS 345(1&2)	Title	Analysis & Design of Algorithms	Credit Hours	3-2-3
Pre/co-requisites	ITCS215 & ITCS 251		Web Page		
Course Instructor	Email	Office Hours	Course Coordinator		
Dr. Ali A Khan	alikhana@itc.uob.bh	UTH: 10:00 - 11:00	Dr. Ali A Khan		

**Course Objectives**

Introduce students to the basic concepts of algorithm analysis and algorithm design. Analyze algorithms on some major data structures that have been studied in earlier courses, as well as introduce a number of new algorithms for solving various problems.

**Course Description**

Students will be introduced to the fundamental notions related to algorithm analysis, with an emphasis on comparing the efficiency of different solutions. Algorithms on some major data structures will be discussed paying special attention to their analysis. Students will get familiar with a range of problem-solving techniques and paradigms for algorithm design. Important algorithms will be considered as implementations of these design techniques. Some NP-complete problems and their approximate solutions will be covered.

**Learning Outcomes**

*On successful completion of this course, students will be able to:*

1. Demonstrate an understanding of big O, Omega, and Theta notation to describe asymptotic upper, lower, and tight bounds on time and space complexity of algorithms.
2. Analyze time efficiency of algorithms in the worst, best and average cases and compare different solutions to a given problem.
3. Compare iterative and recursive solutions for elementary problems and solve a variety of recurrence relations.
4. Understand and apply the Brute-Force, Divide-and-Conquer, Transform-and Conquer, Greedy, and Dynamic Programming design approaches.
5. Solve problems for which Backtracking or Branch-and-Bound is an appropriate solution.

**Textbook**

Anany Levitin, Introduction to the Design and Analysis of Algorithms. Addison-Wesley, 2003; ISBN 0-321-21076-X.

**References**

- M. Weiss. Data Structures and Algorithm Analysis in C++, 2nd ed. Addison Wesley, 1999.
- Horwitz, Sahni, Rajsekharan. Fundamentals of Computer Algorithms
- Coreman, Leiserson, Revist. Introduction to Algorithms
- Gilles Brassard, Paul Brateley. Fundamentals of Algorithms

**Course Assessments**

Term Tests	Laboratory	Quizzes/Assignments	Project	Final Exam
40%		20%	-	40%

**Test Dates**

Test 1	Test 2	Final Exam
Mon., Oct 30, 2006; 11:00-12: 00	Mon., Dec 4, 2006; 11:00-12 :00	Sun., Jan. 14, 2007; 2:30-4:30

**General Notes**

- An important part of the course is the home assignments. These might include solving theoretical problems and programming/experimental tasks. Late submission after the due date will incur a penalty of 10% for each working day after the due date, up to a maximum of 50%. Submissions delayed for more than five days are not accepted. Students' work on the theoretical problems may be assessed through quizzes. Marks can be accessed from the web site. It is students' responsibility to check their marks. Students may challenge their marks only within one week from the date the marks were announced.
- Students are strongly encouraged to use the numerous resources available through the web site.
- Lectures are complemented by help sessions.