

Course specification

(3205 Analysis & design of algorithms)

Faculty: HICIT

Programme(s) on which the course is given: Under graduate program in Computer Science

Major or minor element of programme: Compulsory

Department offering the programme: Department of Computer Science

Department offering the course: Department of Computer Science

Year / Class: 3rd Year – 2nd semester

Date of specification approval: 22/2/2016

A- Basic Information

Title: Analysis & design of algorithms

Code: 3205

Weekly Hours:

Lecture : 3

Exercise: -

Practical :3

Total: 6

B- Professional Information

1- Course Objectives:

Upon completing this course the student will have learned, through appropriate classroom and laboratory experiences, the following.

- The main classic algorithms in various domains.
- Techniques for designing efficient algorithms.
- Applying the algorithms and design techniques to solve problems.
- Having a sense of the complexities of various problems in different domains.

2- Program ILOs Covered by Course

Program Intended Learning Outcomes			
Knowledge and understanding	Intellectual Skills	Professional and practical skills	General and Transferable skills
a4, a14, a21	b1, b2, b3, b4, b5, b6, b7, b17	c5, c6, c10, c16	d9

3. Intended Learning Outcomes (ILOs) of the course

a. Knowledge and Understanding Skills

On successful completion of the course, graduates should be able to:

- a1. Explain asymptotic notation of time analysis and complexity.
- a2. Discuss a variety of useful algorithms.
- a3. Identify the principles and techniques for algorithm design.
- a4. Define the essential mathematics relevant to algorithms.
- a5. Outline a core of analysis and applied mathematics.

b. Intellectual Skills

On successful completion of this course, graduates should be able to:

- b1. Prove the correctness of simple algorithms.
- b2. Define traditional and nontraditional problems, set goals towards solving them.
- b3. Perform comparisons between (algorithms, methods, techniques, etc.)
- b4. Perform classifications of (methods, techniques, algorithms, etc.)
- b5. Summarize the proposed solutions and their results

arguments..

c. Professional and Practical Skills

On successful completion of this course, graduates should be able to:

- c1. Use the divide-and-conquer, greedy, and dynamic programming paradigms to design algorithms.
- c2. Evaluate algorithms in terms of their time analysis within the given problem.
- c3. Specify and apply the main methodologies for designing algorithms.
- c4. Evaluate systems in terms of general quality attributes and possible tradeoffs presented within the given problem.
- c5. Deploy effectively the tools used for designing and analyzing the algorithms.

d. General and Transferable Skills

On successful completion of this course, graduates should be able to:

- d1. Manage tasks effectively.
- d2. Manage one's own learning and development, including time management.
- d3. Search for information and adopt life-long self-learning.
- d4. Communicate effectively by oral, written and visual means.
- d5. Work effectively as an individual and as a member of a team.

4- Contents

Topic	Hours	Lec.	Exc/Lab
Algorithm concept. Analysis & complexity.	6	3	3
Design methods such as Divide & conquer, concept passing through, binary search.	6	3	3
merge sort, quick sort.	12	6	6
selection and matrix multiplication..	6	3	3
Greedy method concept passing through,	9	3	6
shortest paths, Minimum spanning tree.	9	6	3
optimal search trees. Backtracking: the general method,	12	6	6
8 queens	6	3	3
Distributed algorithms.	12	6	6

5 -Teaching and learning methods

- 5.1 Lectures
- 5.2 Tutorial Exercises
- 5.3 Practical Lab
- 5.4 Discussions.

6 -Student assessment methods

- 6.1 Midterm Exam: To assess the knowledge and understanding achieved by the student during the previous weeks.

6.2 Final Exam: To evaluate what the student gain at the end of the course, and to assess: the knowledge and understanding, general skills, and intellectual skills.

6.3 Course Work & Quizzes: To keep the student always in the course, and to evaluate knowledge, understanding, intellectual, and transferable skills.

Assessment Schedule

Assessment	Week #
Mid Term Exam	8
Final Exam	16
Course Work & Quizzes	2-14

Assessment Weight

Assessment	Weigh %
Mid Term Exam	10%
Final Exam	80%
Course Work & Quizzes	10%
Total	100

Course Work & Quizzes: (Short Exams, Assignments, Researches, Reports, Presentations, Class/Project discussion)

7 -List of references

7.1. Required Books

(Textbooks(S. Dasgupta, C. H. Papadimitriou, and U. V. V. Varian, Algorithms, McGraw-Hill, 2007.

7.2 Recommended Books

o Cormen, Leiserson, Rivest, Stein, Introduction to Algorithms, (second edition) MIT Press, 2002.

8- Required Facilities

8.1 Tools/Software

- Visual studio.Net

9-Course Matrices

9.1-Course Content/ILO Matrix

Course Contents	a1	a2	a3	a4	a5	b1	b2	b3	b4	b5	c1	c2	c3	c4	c5	d1	d2	d3	d4	d5
Algorithm concept. Analysis & complexity.	√	√	√	√	√							√	√	√	√					
Design methods such as Divide & conquer, concept passing through, binary search.	√	√	√	√	√	√		√			√	√	√	√	√					
merge sort, quick sort.	√	√	√	√	√	√	√					√	√	√	√					
selection and matrix multiplication..	√	√	√	√	√	√	√					√	√	√	√					
Greedy method concept passing through,	√	√	√	√	√			√				√	√	√	√					
shortest paths, Minimum spanning tree.	√	√	√	√	√	√				√		√	√	√	√					
optimal search trees. Backtracking: the general method,	√	√	√	√	√				√			√	√	√	√					
8 queens	√	√	√	√	√							√	√	√	√					

9.2-Learning Method /ILO Matrix

Learning Methods	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	c5	d1	d2	d3	d4	d5
Lectures	√	√	√	√	√	√	√	√	√	√	√	√	√					
Tutorial Exercises					√	√	√	√	√	√	√	√	√					
Practical Lab					√	√	√	√	√	√	√	√	√					
Discussions.					√	√	√	√	√	√	√	√	√	√	√	√	√	√

9.3-Assessment Methods /ILO Matrix

Assessment Methods	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	c5	d1	d2	d3	d4	d5
Mid Term Exam	√	√	√	√	√	√	√	√	√	√	√	√	√					
Final Exam	√	√	√	√	√	√	√	√	√	√	√	√	√					
Course Work &Quizzes	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

Course Coordinator: Dr.Magdy Elhenawy ()

Head of Department: Dr. Farouk Shabaan ()

Date: 22/2/2016