Form no. (12)
Course Specification

1- Course Data

<table>
<thead>
<tr>
<th>Course Code:</th>
<th>Course Title:</th>
<th>Academic Year/Level:</th>
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<tbody>
<tr>
<td>CS 307</td>
<td>Data and Algorithms Analysis</td>
<td>Third level (First semester)</td>
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<tr>
<th>Specialization:</th>
<th>No. of Instructional Units:</th>
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<tbody>
<tr>
<td>Computer Science</td>
<td>Lecture 2 Lab 1</td>
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2- Course Aim

- This course is designed to encourage in students a sense of interest for Data and Algorithms Analysis concept and the applications in different contexts
- Provide a solid foundation in the major areas of Data and Algorithms Analysis
- Provide education and training of high quality in Algorithm design

3- Intended Learning Outcome

a- Knowledge and Understanding

a1. Describe the main concepts, definitions of algorithms
a2. Review theories and concepts used in Data and Algorithms Analysis
a3. Identify an understanding of the contribution and impacts of Data and Algorithms Analysis in scientific, social, economic, environmental, political and cultural terms.
a4. modeling techniques and algorithm design methods
a5. Evaluating and designing of algorithms
b- Intellectual Skills

b1. Manipulate and apply appropriate theories, principles and concepts relevant to Data and Algorithms Analysis
b2. Critically assess and evaluate the literature within the field of Data and Algorithms Analysis
b3. Deduce and interpret information from a variety of sources relevant to Data and Algorithms Analysis

c- Professional Skills

c1. Plan, design and execute practical activities using techniques and procedures appropriate to Data and Algorithms Analysis

c2. Execute a piece of independent research using Data and Algorithms Analysis and techniques;

d- General Skills

d1. Develop appropriate effective written and oral communication skills relevant to the specific course of Data and Algorithms Analysis

d2. Demonstrate the ability to work effectively as part of a group

d3. Solve problems relevant to Data and Algorithms Analysis using ideas and techniques some of which are at the forefront of the discipline.

d4. Solve problems relevant to applications in real life in computer science using old and new algorithms some of which are at the forefront of the discipline;

4- Course Content

- Problems, Complexity, Analysis;
- Asymptotics, Recurrences;
- The master method, Hashing,
- Dynamic programming,
- Greedy algorithms,
- Depth-1st search;
- Strongly, Connected components,
- Minimum spanning trees,
- Prim's and kruskal's algorithms,
- Single-source shortest paths;
- Bellman-ford, Dijkstra,
- All-pairs shortest paths;
- Floyd-warshall,
- Polynomial time and NP-completeness,
- Proving problems NP-complete,
- Approximation algorithms, String matching
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<tr>
<th>5- Teaching and Learning Methods</th>
<th>Lecturers – Home works - Oral discussion - Quizzes</th>
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<tbody>
<tr>
<td>6- Teaching and Learning Methods for Students with Special Needs</td>
<td>NONE</td>
</tr>
<tr>
<td>7- Student Assessment:</td>
<td></td>
</tr>
<tr>
<td>a- Procedures used:</td>
<td>Lecturers – tutorials- homework – oral discussion - Quizzes</td>
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<tr>
<td>b- Schedule:</td>
<td>Mid-Term exam… …. Week 10 Final exam ……………. Week 17</td>
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<tr>
<td>c- Weighing of Assessment:</td>
<td>Term work (exam + home works) 20% Oral exam 10% Final exam 70%</td>
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<tr>
<td>a- Course Notes</td>
<td>Course notes provided by the Faculty member of Computer Science Division, Math department, to be handled at the beginning of the semester.</td>
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### Required Books (Textbooks)

- **Algorithms**, Robert Sedgewick, Kevin Wayne

### Recommended Books

- **Analysis of Algorithms**, Jeffrey McConnell

### Periodicals, Web Sites, etc.

**Course Instructor:** Dr. Yasser Fouad  
**Head of Department:** Prof. Dr. Mahmoud El-Alem.  
**Date:** 1/9/2012