كلية الحاسبات و المعلومات

جامعة بنها
وحدة الضمان والجودة

Theory of Computation Course Specifications

Course Specifications

Faculty: Computer and Informatics

Department: Scientific Computing

Course Specifications

Program(s) on which the course is given : Bachelor in Computer and Information Sciences

Major or Minor element of programs : Scientific Computing/Computer Science

Department offering the program : Scientific Computing

Department offering the course : Scientific Computing

Academic year / Level : **4** th Year/BSc

Date of specification approval : 5 March 2010

A. Basic Information

Title: Theory of Computation **Code:** SCC 433

Lecture: 3 hrs/week **Practical: 2** hrs/week **Tutorial: ---**

Total: 5 hrs/week

B. Professional Information

1. Overall Aims of Course:

The goal of the course is to introduce Fundamental ideas in the theory of computation, including, computability, complexity, and reducibility among computational problems. This course teaches core ideas in computer science theory, including how to define and investigate a formalized model of computation, and what it means to reduce one problem to another. The course also aims to deepen a student's ability to think clearly, originally, and devise correct proofs.

2. Intended Learning Outcomes of Course (ILOs):

a. Knowledge & understanding :

a1- Explanain and illustrate of the fundamental nature of computation including the understanding of specific models of computation

b. Intellectual skills:

b1- Able to integrate knowledge and understanding of appropriate principles to develop skills in engineering and scientific problem solving .

b2- Able to formulate rigorous proofs.

c. Practical skills:

c1- Able to design and inject solutions to scientific and engineering problems .

d. Transferable skills:

d1. Able to communicate

effectively, eveloped through extensive written home works and working coherently.

3. Contents:

Topic	No. of hours	Lecture	Tutorial/ Practical
Church's thesis: models of computation , Grammars, the μ-recursive functions, Turing computability ,…	5	3	2
Turing computability 1	5	3	2
Turing computability 2	5	3	2
Simple programming languages 1	5	3	2
Simple programming languages 2	5	3	2
Simple programming languages 3	5	3	2
Coding programs by numbers	5	3	2
The Halting Problem	5	3	2
μ-recursive functions,1	5	3	2
μ-recursive functions, 2	5	3	2
Complexity Theory , Time complexity. P and NP. Polynomial-time reducibility. NP-Completeness. The Cook-Levin Theorem. Example reductions among NP-hard sets. – 1	5	3	2
Complexity Theory , Time complexity. P and NP. Polynomial-time reducibility. NP-Completeness. The	5	3	2

Cook-Levin Theorem. Example reductions among NP-hard sets. – 2			
The prepositional calculus: Syntax, Truth-assignment, Validity and satisfiability. Equivalence and normal forms. Compactness. –1	5	3	2
The prepositional calculus: Syntax, Truth-assignment, Validity and satisfiability. Equivalence and normal forms. Compactness. – 2	5	3	2