Faculty of Computers and Information Technology

Theory of Computations

Information :

Course Code : CS416	**Level :** Undergraduate	**Course Hours :** 3.00- Hours

Department :   Department of Computer Science

Instructor Information :

Title	Name	Office hours
Associate Professor	Wael Hassan gomaa Mohamed Abuzaid	1
Assistant Lecturer	Nada Mamdouh Abdelrahman Mohamed	

Area Of Study :

Apply the basic concepts theoretical foundations of computing.
Combine and evaluate the principles of abstract models of computing machines, the grammars those machines recognize, and the corresponding classes of languages.
Use basic mathematics to learn the principles of recursion and grammars induction.
Analyze the analytical requirements of some applications for decidability.
Compare, evaluate and select methodologies from range of complexity hierarchy, the prepositional calculus.

Description :

This course deals with the theoretical foundations of computing, including abstract models of computing machines, the grammars those machines recognize, and the corresponding classes of languages. Topics include church's thesis; grammars, the m-recursive functions, and tuning computability of the m-recursive functions, the incompatibility: the halting problem, tuning innumerability, tuning acceptability, and tuning decidability, unsolvable problems about tuning machines and m-recursive functions, computational complexly: time . Ábounded tuning machines, rate of growth of functions, up . Ácompleteness, the complexity hierarchy, the prepositional calculus: syntax, truth . Ássignment, validity and satisfy, and equivalence and normal forms compactness.

Course outcomes :

a.Knowledge and Understanding: :

1 -	Define the fundamental concepts and theories related to foundations of computing
2 -	Describe methodologies and practices of abstract models of computing machines.
3 -	Select analytical requirements in abstract models of the process of computation such as Turing Machines, its variations, and Post Machines

b.Intellectual Skills: :

1 -	Analyze operations, types of foundations of computing.
2 -	Illustrate the concepts of tuning decidability and unsolvable problems about tuning machines.
3 -	Evaluate the solution of prepositional calculus

c.Professional and Practical Skills: :

1 -	Apply the relation concepts to create simple languages
2 -	Combine the properties of theoretical foundations to generate languages

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3 -	Organize some concepts and theorems to perform computational complexly

d.General and Transferable Skills: :

1 -	Exploit a range of learning resources computations theory.
2 -	Work in a team effectively and efficiently considering time and stress management.
3 -	Apply communication skills and techniques in solving reports.

ABET Course outcomes :

1 -	Apply the basic theoretical concepts and foundations of computing.
2 -	Combine and evaluate the principles of abstract models of computing machines, the grammars those machines recognize, and the corresponding classes of languages.
3 -	Use basic mathematics to comprehend the principles of recursion and grammars induction.
4 -	Analyze the analytical requirements of some applications for decidability.
5 -	Compare, evaluate and select methodologies of complexity hierarchy and prepositional calculus

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Background to Theory of Formal Languages	4	2	2
Introduction to Formal Languages	4	2	2
Regular Expressions	4	2	2
Finite Automata	4	2	2
Non Deterministic Finite Automata	4	2	2
Transition Graphs	4	2	2
Context-Free Grammars	4	2	2
Pushdown Automata	4	2	2
Mid-Term Exam	2		
Equivalence of Computing Paradigms	4	2	2
Turing Machines	4	2	2
Post Machines	4	2	2
Computers	4	2	2
Final Exam	2		

Teaching And Learning Methodologies :

Interactive Lectures including Discussions
Tutorials
Practical Lab Sessions
Self-Study (Project / Reading Materials / Online Material / Presentations)
Problem Solving

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Assignments	10.00	4	
Final Exam	40.00	14	
Midterm Exam (s)	20.00	9	
Others (Participations)	10.00		
Quizzes	20.00	5	

Course Notes :

An Electronic form of the Course Notes and all the slides of the Lectures is available on the Students Learning Management System (Moodle)

Recommended books :

John E. Hopcroft, Rajeev Motwani, and Jeffrey Ullman, Introduction to Automata Theory Languages and Computation, 2nd Ed., Addison Wesely, 2001