UNIVERSITI TEKNOLOGI MARA
CSC701: AUTOMATA THEORY AND FORMAL LANGUAGE

Course Name (English)	AUTOMATA THEORY AND FORMAL LANGUAGE APPROVED
Course Code	CSC701

MQF Credit	3

Course Description	The goal of this course is to study abstract computing devices or "machines". Finite automata is a simpler kinds of machines used to model hardware and software and used extensively in compiler design and construction. The studies of formal "grammars" is incorporated because of the close relationships to abstract automata especially as a basis of software components including parts of compilers. Towards the end, students will be introduced to the Turing Machine, a simple model of a computer and discuss about the kind of languages abstract computers can accept

Transferable Skills	Demonstrate ability to apply creative, imaginative and innovative thinking and ideas to problem solving

Teaching Methodologies	Lectures, Presentation

CLO		
	CLO1	Explain how the relevant theories pertaining to respective models of computation
	CLO2	Construct a relevant automata based on a given grammar and vice versa
	CLO3	Build a program for the automata based on the formal languages given

Pre-Requisite Courses	No course recommendations

Topics
1. MATHEMATICAL PRELIMINARIES AND FINITE AUTOMATA 1.1) Mathematical Preliminaries -Sets,Alphabets,Languages,Graph 1.2) Deterministic and Non Deterministic Finite Automata
2. REGULAR LANGUAGES AND REGULAR GRAMMARS 2.1) Finite Automata and Regular Expressions 2.2) Regular Grammar
3. PROPERTIES OF REGULAR LANGUAGES 3.1) Closure Properties of Regular Languages
4. CONTEXT-FREE GRAMMARS AND LANGUAGES 4.1) Context Free Grammar, Derivation Trees
5. SIMPLIFICATION OF CONTEXT FREE GRAMMARS 5.1) Chomsky and Greibach Normal Form 5.2) Applications of CFG
6. PUSHDOWN AUTOMATA 6.1) Informal description and definitions 6.2) The language of PDA
7. CONTEXT FREE LANGUAGES 7.1) Equivalence of PDA and CFL
8. PROPERTIES OF CONTEXT-FREE LANGUAGES (CFL) 8.1) Pumpiing Lemma , closure properties and decision algorithm of CFL
9. TURING MACHINES AND COMPUTERS 9.1) Standard Turing Machine and techniques for Turing Machine construction 9.2) Turing machines as enumerators and variations of Turing machines

10. CHOMSKY HIERARCHY
10.1) Church Turing Thesis
10.2) Relations Between Classes of Languages

Assessment Breakdown	%
Continuous Assessment	100.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	Assignment	30%	CLO1
	Group Project	Group project	30%	CLO3
	Quiz	Quiz 1	5%	CLO1
	Quiz	Quiz 2	5%	CLO2
	Test	Test 1	15%	CLO1
	Test	Test 2	15%	CLO2

Reading List	Recommended Text	• Linz, P. 2006, *An Introduction to Formal Languages and Autom*, 4 Ed., University Of California, Joan & Bartlett Pu
		• Hopcroft J.E., Motwani J, & Ullman J.D. 2013, *Introduction To Automata Theory, Languages An*, Addison Wesley
	Reference Book Resources	• Debidas Ghosh, 2013, *Introduction To Theory Of Automata, Formal Languages and Computation*, PHI Learning Private Limited Delhi
		• Alexander Meduna 2012, *Automata and Languages*, Springer Science & Business Media
		• Alexander Meduna,Petr Zemek 2014, *Regulated Grammars and Automata*, Springer [ISBN: 9781493903689]
		• Gorgy E. Revesz 2013, *Introduction To Formal Languages*, Springer Science and Business Media
		• Stefano Crespi Reghizzi,Luca Breveglieri,Angelo Morzenti 2013, *Formal Languages and Compilation*, Springer [ISBN: 9781447155133]
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	