Liverpool John Moores University

Title:	Automata, Languages and Computation
Status:	Definitive
Code:	**5504SEPA** (129463)
Version Start Date:	01-08-2021
Owning School/Faculty:	Computer Science and Mathematics
Teaching School/Faculty:	Beaconhouse IC Islamabad

Team	Leader
Paul Bell	Y

Academic Level:	FHEQ5	**Credit Value:**	20	**Total Delivered Hours:**	46
Total Learning Hours:	200	**Private Study:**	154		

Delivery Options
Course typically offered: Semester 1

Component	Contact Hours
Lecture	22
Practical	22

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	AS1	Report on topics within automata and formal language theory	40	
Exam	AS2	Examination	60	2

Aims

To provide knowledge of automata theory, formal language theory, limits of computation and their relation to Computer Science applications, including compilers.

Learning Outcomes

After completing the module the student should be able to:

1	Demonstrate the ability to convert regular expressions, deterministic and nondeterministic finite automata and explain their characteristics.
2	Utilize regular languages and context free grammars to represent programming language specifications.
3	Reason about context free grammars and prove languages are not regular via the pumping lemma.
4	Appreciate the limits of effective computation.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Report	1	2	
Examination	1	3	4

Outline Syllabus

Regular expressions (Regex), deterministic finite automata (DFA), nondeterministic finite automata (NFA) and probabilistic finite automata (PFA) and their applications in Computer Science
Conversions between Regexs, DFA and NFA, their closure properties and decision algorithms
Context free/sensitive languages, pushdown automata and the pumping lemma
Lexical analysis and parsing of programming languages and connections to regexs and context free grammars
Computability theory including Turing machines, the Halting problem and Post's correspondence problem

Learning Activities

Learning activities will be through lectures and practical sessions where students will be encouraged to ask questions and discuss case studies. The practical sessions will be based around supported labs where students will be encouraged to put the theory gained in lectures into practice.

Notes

This module provides an introduction to automata theory and formal language theory and emphasizes real life application where these ideas are applicable. Particular attention is paid to compiler design considerations using regular expressions and context free grammars. The module also investigates the limits of effective computation by studying undecidable problems.