Automata, Languages and Computation

Module Information

2022.01, Approved

Summary Information

Module Code	5004SEQR
Formal Module Title	Automata, Languages and Computation
Owning School	Computer Science and Mathematics
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 5
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
LJMU Partner Taught

Partner Teaching Institution

Institution Name
Oryx Universal College WLL

Learning Methods

Learning Method Type	Hours
Lecture	22
Practical	22

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
APR-PAR	PAR	April	12 Weeks
JAN-PAR	PAR	January	12 Weeks

SEP-PAR	PAR	September	12 Weeks

Aims and Outcomes

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

After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Demonstrate the ability to convert regular expressions, deterministic and nondeterministic finite automata and explain their characteristics.
MLO2	2	Utilize regular languages and context free grammars to represent programming language specifications.
MLO3	3	Reason about context free grammars and prove languages are not regular via the pumping lemma.
MLO4	4	Appreciate the limits of effective computation.

Module Content

Outline Syllabus	Regular expressions (Regex), deterministic finite automata (DFA), nondeterministic finite automata (NFA) and probabilistic finite automata (PFA) and their applications in Computer ScienceConversions between Regexs, DFA and NFA, their closure properties and decision algorithmsContext free/sensitive languages, pushdown automata and the pumping lemmaLexical analysis and parsing of programming languages and connections to Regexs and context free grammarsComputability theory including Turing machines, the Halting problem and Post's correspondence problem
Module Overview	
Additional Information	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.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Report	Report	40	0	MLO1, MLO2
Centralised Exam	Examination	60	2	MLO1, MLO3, MLO4

Module Contacts