Liverpool John Moores University

Title:	COMPUTATION THEORY
Status:	Definitive
Code:	**7065COMP** (120323)
Version Start Date:	01-08-2019
Owning School/Faculty:	Computer Science
Teaching School/Faculty:	Computer Science

Team	Leader
Somasundaram Ravindran	Y

Academic Level:	FHEQ7	**Credit Value:**	20	**Total Delivered Hours:**	38
Total Learning Hours:	200	**Private Study:**	162		

Delivery Options
Course typically offered: Semester 2

Component	Contact Hours
Lecture	24
Workshop	12

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	AS1	Investigate programming languages and grammar and apply abstract machines to problem definitions.	50	
Exam	AS2	Examination.	50	2

Aims

To provide a rationale for the major concepts involved in computing: Investigating the underpinnings of computer systems and the concepts upon which programming languages are founded.
To build on previous knowledge, in software development, to formalise concepts of computability and complexity.

To synthesise problem definitions and likely computability based on common varieties of problems.

Learning Outcomes

After completing the module the student should be able to:

1	Define, design and use formal models of computation, including finite state automata/machines, pushdown automata, and Turing machines, applied to grammars for languages and computational problems to ascertain the limits of computation.
2	Apply knowledge on the limitations of computation to identify complexity classes, using time and space, and deduce the complexity of various algorithms: Using NP-completeness concepts to create proofs regarding the computational complexity of problems.

Learning Outcomes of Assessments

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

Report	1
Examination	2

Outline Syllabus

Automata and Languages
Finite State Machines
Deterministic, Non-Deterministic and Universal Turing Machines
Recursive Functions, Primitive, Partial and Total Recursion
Church Turing Thesis
The Halting Problem and Decidability
Complexity Theory
Time Complexity
Space Complexity
Non-Deterministic Algorithms
Complexity Classes P and NP
NP Complete Problems

Learning Activities

Lectures followed by tutorial sessions.

Notes

Computation theory is concerned with describing the underlying foundations on which computing and computability is based. It aims to give insight into the

characteristics of computation. As such knowledge of computation theory is essential for a complete understanding and best practice approaches for computing professionals. It provides the basic constructs on which all programming on computers is founded and shows that there are problems that cannot be solved. More importantly it also provides tools for identifying those problems amenable to solution. In addition computation theory formalises intuitive notions regarding computation itself.