Algorithmics (COMP0070)

**Description**

**Aims:**  
To introduce more formal aspects of algorithms and data structures, techniques for analysing the complexity of algorithms, and to discuss the limits of computation (intractable and undecidable problems).

**Learning outcomes:**  
On successful completion of the module, a student will be able to:  
1. Understand how to use a variety of data structures;  
2. Understand a variety of common algorithms and why some are more efficient than others;  
3. Carry out time complexity analysis in a variety of scenarios;  
4. Discuss intractable and undecidable problems.

**Content:**  
Course Introduction:  
Algorithms and Data Structures:  
- Why study algorithms and data structures?  
- Pseudocode;  
- Efficiency of algorithms;  
- Recursion;  
- Arrays;  
- Approaches to algorithm design including greedy and divide and conquer;  
- Graph traversal;  
Analysis of Algorithms:  
- Empirical vs theoretical analysis;  
- Algorithmic complexity;  
- O-notation;  
- Forms of time complexity analysis (worst case, average case, best worst case);  
- Sums of series and simple summation formulae;  
- Recursive algorithms and recurrence relations;  
Limits of Computation:  
- Tractable and intractable problems;  
- The complexity classes P, NP, NPC;  
- Undecidability.

**Key information**

**Year**  
2019/20

**Credit value**  
15 (150 study hours)

**Delivery**  
PGT L7, Campus-based

**Reading List**  
View on UCL website

**Tutor**  
Dr Denise Gorse

**Term**  
Term 1

**Timetable**  
View on UCL website

**Assessment**

- Written examination (main exam period): 85%
- Coursework: 10%
- Coursework: 5%

**Find out more**

For more information about the department, programmes, relevant open days and to browse other modules, visit ucl.ac.uk

Disclaimer: All information correct as of August 2019. Please note that aspects of the module may be subject to change. UCL will make best efforts to inform applicants of major changes.
Requisites:
In order to be eligible to select this module, a student must be registered on a programme for which it is a formally-approved option or elective choice AND must have also selected COMP0066, COMP0067, COMP0068, and COMP0069.