COMP36111: Advanced Algorithms I
Lecture 0: Introduction and Course Organization

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2019–20
Outline

Syllabus

Resources
Part A: Algorithms

- Directed graphs: Tarjan’s algorithm and topological orderings
- Undirected graphs: union find and the inverse Ackerman function
- Flow optimization and matching
- The stable marriage problem and the Gale-Shapley algorithm
- String matching and the KMP algorithm.
• Part B: Complexity
  • Turing Machines and computational complexity
  • Some problems from logic: upper bounds
  • Hardness and reductions: Cook’s theorem
  • Some problems from graph theory: 3-colouring, Hamiltonian and Eulerian circuits, the TSP
  • Some problems from logic: lower bounds
  • Savitch’s theorem and the Immerman-Szelepcsényi theorem
  • How to pass the exam.
• **Coursework (30%)**
  - 36111-cwk1-F-Formulating Arguments; Out of 20; Deadline End Wk II Oct 4th 14:00 (formative)
  - 36111-cwk2-S-exercisesA; Out of 20; Deadline End Wk IV Oct 18th 14:00 (summative)
  - 36111-cwk3-S-exercisesB; Out of 20; Deadline End Wk IX Nov 22nd 14:00 (summative).

• **Exam (70%)**
  - Answer 3 questions in 2 hours.
  - Previous years’ exams provide a guide to the style of questions.
Outline

Syllabus

Resources
• Course texts
  
  Title: Algorithm design: foundations, analysis and internet examples
  Author: Goodrich, Michael T. and Roberto Tamassia
  ISBN: 0471383651
  Publisher: Wiley
  Year: 2002

  Title: Introduction to the theory of computation
  Author: Sipser, Michael
  ISBN: 053494728X
  Publisher: PWS Publishing Company
  Year: 1997
• Principal course website
  http://studentnet.cs.manchester.ac.uk/ugt/2019/COMP36111/syllabus/

• This course does not use blackboard.

• Course materials page
  http://studentnet.cs.manchester.ac.uk/ugt/2019/COMP36111/
  • homework exercises
  • lecture overheads
  • fun problems