

# Revision guide for COMS30041 2021/22

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## 1 Guide

The January exam for COMS31900 will have 3 questions and will be 2 hours long. You should answer all of the questions. The exam will be online where you will upload an image of your written answers. You should sit the exam under conditions as close to a normal exam as possible.

This document lists the topics that will be examinable. Where a topic is mentioned, you will be expected to have mastered all the related material in the lecture and problem sheets. For example, where suffix trees are mentioned this is understood to include generalised suffix trees, and the applications such as pattern matching and any listed in the problem sheets. The topics that are examinable are:

- Randomness, independence, hash functions, static perfect hashing, cuckoo hashing, Bloom filters, van Emde Boas trees, orthogonal range queries, suffix trees and applications, suffix arrays including use and linear time construction, LCA/RMQ including related reductions.
- NP-completeness, reductions, approximation algorithms, constant factor approximation, PTAS algorithms, FPTAS algorithms.

To avoid confusion, for all the approximation algorithms listed above, you should know how they work and be able to reason both about their running time and their correctness. For the other algorithms, you should know the material that was in the lectures.

The following is a list of material that will not be examinable:

- Proofs from the orthogonal range search lecture. You **will** however be expected to know the relevant algorithms and data structures and to be able to apply the techniques to novel problems.
- Proofs from the last three lectures. You **will** however be expected to be able to apply the algorithmic approximation and proof techniques to the problems covered and to problems not covered in lectures.

### 1.1 Past papers and exercises

In the first instance make sure you fully understand the lecture notes, the relevant parts of the linked notes from the unit web page and problem sheets.

- For exercises related to suffix trees and arrays I recommend the book [Gusfield] which is available for free online from the library.
- Past papers are now available on the Blackboard page.