

Exam Information

This section describes the format of the 2017 COMP30026 exam and what material is examinable.

Format

The exam is a 3-hour written exam, with 15 minutes reading time. A practice exam paper is available in the same area as this document. That paper gives an indication of the format of the exam paper. Some of the logic content of COMP30026 was previously taught in 433-295 Discrete Structures, and some of the regular/context-free language content, as well as the computability content, was taught in 433-330 Theory of Computation and 433-325 Theoretical Computer Science, so it may be worth browsing old exam papers from those subjects. Old exam papers are available online from the University Library.

Examinable Material

All material covered in lectures is examinable, except as indicated below. The references to lecture slides are to the version of slides published on the LMS after each lecture (sometimes they differ from the pre-lecture version). 'Makinson' refers to "Sets, Logic, and Maths for Computing", available as an e-book through the University Library. 'Dowsing' refers to the "Reading on Predicate Logic" available under Readings Online on the LMS. Similarly, 'Sipser' refers to "Regular languages", and 'Sudkamp' refers to "Context-free grammars".

Basic Haskell programming (corresponding to *Lecture 2 and 3* and Grok exercises) is examinable. It is possible that an exam question will ask you to read or write simple Haskell code, for example to implement some discrete mathematics concept. If so, the Haskell required will be a subset of what was needed for Grok exercises, and minor syntax errors will be ignored.

Assume that functions from the Haskell Prelude can be used freely, but do not assume that other library functions can be used, unless explicitly stated.

Propositional logic and propositional resolution: All material from *Lectures 3, 4 and 5* is examinable. Supporting reading, if needed, includes Makinson, parts of Chapter 8.

Predicate logic: All material from *Lectures 6, 7 and 8*.

Resolution for predicate logic: All material from *Lecture 9* is examinable, including the unification algorithm. (You can skip slides 9-25 to 9-32.) Dowsing covers the same material in greater depth, but note that they use a different unification algorithm. In Dowsing, the sections on 'Clausal form' and 'Refutation by Resolution' are relevant, as they expand on what we did in lectures. Material covered by Dowsing but not by us, such as the 'semantic tree' and the many variants of resolution, is not examinable.

Mathematical proof (*Lecture 10*): You are expected to be able to provide properly structured proofs for simple theorems about languages and other discrete structures. However, you can skip slides 10-19 to 10-26. If you need supporting material on induction principles, see Makinson Sections 4.1-4.6.

Sets, binary relations and functions: All material from *Lectures 11 and 12* is examinable. Supporting reading, if needed, can be found in Makinson Chapters 1-3.

Regular languages: All material from *Lectures 13, 14 and 15* is examinable, including the pumping lemma for regular languages, although you will not

be asked to repeat its proof, only (possibly) to apply it. The material on regular languages is covered in greater depth in Sipser.

Context-free languages: The material from *Lectures 16 and 17* is examinable, including the pumping lemma for context-free languages, although you will not be asked for its proof, only (possibly) to apply it. The material on context-free languages is covered in greater depth in Sudkamp.

Turing machines, computability, and decidability: The material from *Lectures 18, 19, 20, and 21* is examinable. You will not be asked to reproduce any of the results, but you are expected to know about the decidability or otherwise of the problems discussed in those lectures, and (possibly) to use that knowledge to produce simple decidability/undecidability proofs by reduction.

The slide set appendix on busy beavers is not examinable.

Exam Preparation

Work through the practice exam paper and old exam papers. You may also want to revisit the tutorial exercises. Use the LMS Discussion Board - it will stay open until the exam. We will organise a catch-up tute in swot vac, partly so that we can provide general feedback on Assignment 2. To help determine the best time, please take the doodle poll before Thursday in Week 12.

The Exam

Make sure you know where the exam is held, and be there on time. It is a closed-book exam. Electronic devices, including calculators and laptop computers are not permitted. University rules say that you should use blue or black ink for written answers.

You can read the exam paper's cover page before the exam. It is available in the same area as this document. The cover page has more detailed instructions.