

DM553 Lecture 10 — DM508 Lecture 1

Textbook and notes for DM508

Introduction to the Theory of Computation, 3rd edition, by Michael Sipser, Cengage Learning, 2013.

Introduction to Algorithms, 3rd edition, by T. Cormen, C. Leiserson, R. Rivest, and C. Stein, MIT Press, 2009.

Extra notes (also available in the bookstore): *DM553/DM508 Komplexitet og bergnelighed / Algoritmer og kompleksitet, Noter forår 2015*. This is a subset of the notes for DM508 from 2010, 2011, 2012, 2014, and 2014 and is from the following source:

- *Computer Algorithms: Introduction to Design and Analysis*, second edition, by S. Baase, Addison-Wesley, 1987.

Format for DM508

Lectures will be in English. The discussion sections will be led by the “instruktør”, Christian Nørskov. Please read the appropriate sections in the textbook or notes before coming to class and bring your textbook with you. There will both be assignments which you are required to turn in and other problems and exercises which you should be prepared to discuss in the discussion sections (øvelserne/træningstimerne), usually shortly after the relevant lecture.

Check the electronic schedule regularly, since changes can occur. Note that the discussion section scheduled for Thursday, April 9 (week 15), is not for DM508, but only for DM553. The two required assignments will be graded on a Pass/Fail basis, and satisfactory completion of both assignments is required in order to take the exam. The assignments must all be turned in on time using the Blackboard system, submitted via the menu item “SDU Assignment”. Turn in each assignment as a single PDF file. Do not use any Danish letters or other non-ASCII symbols in the name of the file. Keep the receipt it gives you proving that you turned your assignment in on time. You may work in groups of 2 to 3 students if you wish. These two assignments must be approved in order for you to take the oral exam, so cheating on these assignments is viewed as cheating on an exam. You are allowed to talk about course material with your fellow students, but working together on assignments with students not in your group is cheating. (You can, however, talk with Christian or me.) Using solutions you find elsewhere, such as on the Internet, is also cheating. You may do the assignments in either English or Danish, but if you write them by hand, please do so very neatly. You will be allowed to redo one of the two assignments if it is not approved the

first time (if one of your assignments is late, then you will have used up your one chance to redo an assignment).

The weekly notes and other information about the course are available through the World-wide Web. Use Blackboard or the URL:

<http://www.imada.sdu.dk/~joan/dm553/index15.html>

I have office hours 13:15–14:00 on Mondays and 8:15–9:00 on Thursdays.

There will be an oral exam on June 30 (or 29). The set of exam questions will be available later in the course. You may do your exam in Danish if you wish (in most cases it is advisable to do it in Danish).

DM553 Lecture, March 17

We finished chapter 5, skipping the last part of section 5.1, having to do with reductions via computation histories.

Lecture, April 8

We will begin on NP-Completeness, introducing definitions and showing that 3-SAT and CLIQUE are NP-Complete. To do this, we assume that CNF-SAT is NP-Complete. See the proof that 3-SAT is NP-Complete combines the proofs in both the Sipser and the CLRS books. The definition of time complexity classes is on page 279 in Sipser's textbook, and the definition of P is on page 286. The definitions of NP and NP-Complete are in sections 7.3 and 7.4 of Sipser's textbook. Note that some of this is also in chapter 34 in the CLRS book.

Lecture, April 13

We will cover the proof that SATISFIABILITY (actually CNF-SAT) is NP-Complete, from section 7.4 in Sipser's textbook. If there is time, we will do more reductions from chapter 34 in CLRS.

Problems to be discussed in U142 on April 14

In the CLRS textbook, do the following:

1. 34.2-4 (skip Kleene star), 34.2-8.
2. 34.3-7 (34.3-6 has the definition of complete you need).
3. 34.4-4, 34.4-5, 34.4-6, 34.4-7.

If not all problems are finished, the most important ones missed will be done later.