Notes on Computational Complexity Theory
CPSC 468/568: Spring 2017

James Aspnes

2016-10-29 11:54
List of Figures
List of Tables
List of Algorithms
Preface

These are notes for the Spring 2017 semester of the Yale course CPSC 468/568 Computational Complexity. This document also incorporates the lecture schedule and assignments. Because this is a work in progress, it will be updated frequently over the course of the semester.

The Spring 2016 version of the course was taught by Joan Feigenbaum, and the organization of this course is in part based on her example. Information about the Spring 2016 course, including lecture notes and assignments, can be found at http://zoo.cs.yale.edu/classes/cs468/.

Much of the course follows the textbook, *Computational Complexity: A Modern Approach*, by Sanjeev Arora and Boaz Barak. In most cases you’ll find this textbook contain much more detail than what is presented here, so it is probably better to consider these notes a supplement to it rather than to treat them as your primary source of information.
Syllabus

Description

Introduction to the theory of computational complexity. Basic complexity classes, including polynomial time, nondeterministic polynomial time, probabilistic polynomial time, polynomial space, logarithmic space, and nondeterministic logarithmic space. The roles of reductions, completeness, randomness, and interaction in the formal study of computation. After Computer Science 365 or with permission of the instructor.

Meeting times

Monday and Wednesday 1:00–2:15 in [[ To be announced. ]].

On-line course information

The lecture schedule, course notes, and all assignments can be found in a single gigantic PDF file at http://www.cs.yale.edu/homes/aspnes/classes/468/notes.pdf. You should probably bookmark this file, as it will be updated frequently.

For office hours, see http://www.cs.yale.edu/homes/aspnes#calendar

Staff

The instructor for the course is James Aspnes. Office: AKW 401. Email: james.aspnes@gmail.com. URL: http://www.cs.yale.edu/homes/aspnes/
Textbook

The textbook for the class is:

Reserved books at Bass library

[[[ reserved books ]]]

Course requirements

Six homework assignments (60% of the semester grade) plus a final exam (40%).

Use of outside help

Students are free to discuss homework problems and course material with each other, and to consult with the instructor or a TA. Solutions handed in, however, should be the student’s own work. If a student benefits substantially from hints or solutions received from fellow students or from outside sources, then the student should hand in their solution but acknowledge the outside sources, and we will apportion credit accordingly. Using outside resources in solving a problem is acceptable but plagiarism is not.

Clarifications for homework assignments

[[[ Piazza ]]]

From time to time, ambiguities and errors may creep into homework assignments. Questions about the interpretation of homework assignments should be sent to the instructor at james.aspnes@gmail.com. Clarifications will appear in an updated version of the assignment.

Late assignments

Late assignments will not be accepted without a Dean’s Excuse.
Lecture schedule

As always, the future is uncertain, so you should take parts of the schedule that haven’t happened yet with a grain of salt. Readings refer to chapters or sections in the course notes, except for those specified as in [[[ textbook short name ]]], which refer to the course textbook [[[ cite textbook ]]].

Office hours, lecture times, and assignment due dates can be found at http://www.cs.yale.edu/homes/aspnes#calendar.

2016-01-18 [[[ To be announced. ]]]
2016-01-20 [[[ To be announced. ]]]
2016-01-23 [[[ To be announced. ]]]
2016-01-25 [[[ To be announced. ]]]
2016-01-30 [[[ To be announced. ]]]
2016-02-01 [[[ To be announced. ]]]
2016-02-06 [[[ To be announced. ]]]
2016-02-08 [[[ To be announced. ]]]
2016-02-13 [[[ To be announced. ]]]
2016-02-15 [[[ To be announced. ]]]
2016-02-20 [[[ To be announced. ]]]
2016-02-22 [[[ To be announced. ]]]
2016-02-27 [[[ To be announced. ]]]
2016-03-01 [[[ To be announced. ]]]
LECTURE SCHEDULE

2016-03-06 [To be announced.]
2016-03-08 [To be announced.]
2016-03-27 [To be announced.]
2016-03-29 [To be announced.]
2016-04-03 [To be announced.]
2016-04-05 [To be announced.]
2016-04-10 [To be announced.]
2016-04-12 [To be announced.]
2016-04-17 [To be announced.]
2016-04-19 [To be announced.]
2016-04-24 [To be announced.]
2016-04-26 [To be announced.]

2016-05-06  Final exam, starting at 2:00pm, in a location to be determined by the Registrar. It will be a closed-book test covering all material discussed during the semester.
LECTURE SCHEDULE

[[[ need some content ]]]
Appendix A

Assignments

[[[ Assignments should be submitted in PDF format via the class-esv2 Drop Box (or replaced with whatever is available this semester). ]]]

[[[ where to send questions blurb ]]]

A.1 Assignment 1: due Wednesday, 2017-01-25 at 23:00
[[[ To be announced. ]]]

A.2 Assignment 2: due Wednesday, 2017-02-08 at 23:00
[[[ To be announced. ]]]

A.3 Assignment 3: due Wednesday, 2017-02-22 at 23:00
[[[ To be announced. ]]]

A.4 Assignment 4: due Wednesday, 2017-03-08 at 23:00
[[[ To be announced. ]]]
A.5 Assignment 5: due Monday, 2017-04-10 at 23:00

[[[ To be announced. ]]]

A.6 Assignment 6: due Monday, 2017-04-24 at 23:00

[[[ To be announced. ]]]
[[[ more assignments ]]]