School of Computer Science – Coursework Issue Sheet (required for each Saturn component)

Session	2017/2018	Semester	Autumn
Module Name	Project in Advanced Algorithms and Data Structures	**Code**	G54PAD
Module Convenor(s) (CW Convenor in Bold)	Venanzio Capretta Andrew Parkes		

Coursework Name	Component 2: Project Report	Weight	75%
Deliverable (a brief description of what is to be handed-in; e.g. 'software', 'report', 'presentation', etc.)	The written report should be 10-15 pages long. It must be submitted together with the source code of the implementation.		
Format (summary of the technical format of deliverable, e.g. "C source code as zip file", "pdf file, 2000 word max", "ppt file, 10 slides max", etc.)	The following files must be submitted: `report.pdf`: report, 10-15 pages in PDF format. `source.zip`: source code for implementation and data. It must contain a README file with information about the language and tools used and instructions on how to compile it. It must run on the School's computers.		

Issue Date	19 October 2017
Submission Date	12 January 2018
Submission Mechanism	Submission link on Moodle
Late Policy (University of Nottingham default will apply, if blank)	
Feedback Date	2 February 2018
Feedback Mechanism	Moodle

Instructions	The project consists in reading some literature about an advanced data structure and its associated algorithms, implement it from scratch on a programming language of your choice, give a presentation about it and write a report. The topic is assign from a list of 10 possibilities. You will have the chance to give a list of options and we will divide the projects in a balanced way, trying to satisfy your preferences as much as possible. Each project specifies a reference to the literature. The books used are: [IA] *Introduction to Algorithms*, by Cormen, Leiserson, Rivest and Stein, 3rd edition

- [AI] *Artificial Intelligence*, by Russell and Norvig
- [PFDS] *Purely Functional Data Structures*, by Chris Okasaki
- [AC] *Algorithms and Complexity*, by Herbert S. Wilf
- [RWH] *Real World Haskell*, by O'Sullivan, Goerzen and Stewart

The possible topics are the following. Have a look at the description and introduction in the provided literature and form an opinion of which ones you are most interested in. They are roughly in order of difficulty for 0-10, but then 11-14 need not be so hard. Choosing a harder one will be more challenging but it will be rewarded by the chance of a higher mark.

0. Skip Lists
1. B-trees [IA, Ch.18]
2. AVL trees [IA, 13-3]
3. Treaps [IA, 13-4]
4. Bloom filters [RWH, Ch.26; Network Applications]
5. Streams [PFDS, 4.2] (*)
6. Primality Testing [AC, 4.4-4.7] (*)
7. The RSA cryptosystem [AI, 31.7] (*)
8. Graph Algorithms [AC, 2.3] (*)
9. Fast Fourier Transform [IA, ch.30; AC, 2.5-2.6]
10. Neural Networks [AI, 18.7]
11. Finger Trees (wiki)
12. Cuckoo hashing (wiki)
13. Compact Suffix trees (wiki)
14. Tango Trees (wiki)
15. Binary Decision Diagrams (wiki)

Note that some of these, as marked with a "(*)" are rather underspecified and so you will need to talk with us about what will be required. E.g. for "8. Graph Algorithms" some specific data structure and/or algorithm will need to be selected.

Please send us an email containing your choices.
The email must have the subject "G54PAD preferences". The text must be a single line containing your first name, surname, and the list of topic numbers in order of preference, separated by spaces. For example, it may look like this:
```
Venanzio Capretta 2 6 4 5 9 8 1 3 10 7
```
indicating that topic number 2 is my favourite and topic number 7 my least favourite. We will try to assign the topics in a way to maximize preferences.

	If there is some other algorithm or data structure that you are keen to study, then also feel free to ask us if it can be done. Initial allocation of topics will start on Oct 20th.
Assessment Criteria	We will apply the following marking criteria: - Introduction 10% - Difficulty 20% - Analysis 20% - Implementation 20% - Empirical evaluation 20% - Quality of writing 10%