**A Note to Future Freshers**

Dear Future Freshers,

These exams were all online and open book, so to increase the difficulty most of the exam papers are pretty time pressured. If you can finish them in 95 mins, you’re doing well. We’ve compiled below a summary of the papers and some resources we used both for the exams and throughout the year, which you may find helpful.

Good luck,

2020-21 Freshers

Notes on 2021 papers:

* 40001 - Introduction to Computer Systems
  + Almost all the questions can be found in the notes, a very chill exam overall. Not very time pressured.
  + Chill
* 40002 – (40017 - Linear Algebra in 2022)
  + Linear Algebra section is long. Make sure to use free Wolfram Alpha Pro. Analysis section is shorter but harder. Pretty time pressured.
  + A tip on finding eigenvalues: the sum of all eigenvalues is equal to the trace of the matrix (that is the sum of the elements on the diagonal of the matrix from top-left to bottom-right), and the product of all eigenvalues is the determinant of the matrix. For example, if the matrix is 3\*3 and you’ve found one eigenvalue, you can easily solve for the other two. Too bad I learned this AFTER the exam L.
  + Be smart about which questions you attempt as some questions take waay longer than others and their weightage doesn’t justify the time spent. 2cii is a good question to skip lol.
* 40003 Logic (40018 - Discrete Mathematics, Logic & Reasoning in 2022)
  + Not too bad overall. No real pain points and past papers helped, Pandora recommended for proofs. Okay for time.
  + PLEASE get comfortable with Pandora before the exam as it can cut down time by half (if you have online exams L, otherwise, grind ND till you’re numb).
* 40004 (40018 - Discrete Mathematics, Logic & Reasoning in 2022)
  + Hardly Steffen’s worst. Early parts are largely trivial, with harder questions being either from the notes or very similar to questions in the notes. Moderately time pressured.
  + Note that all the parts are equally weighted, so you can actually spend more time on harder questions as first parts of each question are fairly easy. Make sure you are comfortable with all questions in the notes as the exam questions are just different versions which you can adapt your answer to.
* 40005 - Introduction to Computer Architecture
  + Much nicer than we expected. Data path coursework very helpful in first section. Second half was similar to previous years, solutions to final section can be found online. Okay for time.
* 40006 Reasoning about Programs
  + First section very similar to past papers (2018/2019). Second section harder than first imo. Unsure on time as my laptop BSOD’d :(.
  + (Another student) The first section went OK for me, but the second one is a bit time-consuming, especially so if you spend a bit much on finding the invariant. I did the question that requires proof last.
  + Invariants in this paper are tricky but otherwise you can attain \*most\* marks in Q2. Aim to perfect Q1 so that you can go easy on Q2 as much easier to lose marks here.
* 40007 - Introduction to Databases
  + Nicer than expected. Uses the same Mondial database as 2020 paper which can be found on the lab machines. ER diagram relatively straightforward. Function dependency calculator below recommended. Reasonabpoopoole for time.
* 40008 - Graphs and Algorithms
  + Iain went soft on us thankfully. Notes somewhat helpful for questions found in the exam. Nice NP-Complete question, similar to 2018 Question (See Complexity PMT solution). Not time pressured, a nice one to finish on.
  + DON’T ignore union finds, we essentially had to learn it during the exam J.
  + This is just a guess, but priority queues may also occur in the exam. I haven’t seen much priority queue in the past papers and course-works, but I haven’t seen any union find either before our exam xD.

Helpful Resources used:

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| **Course** | **Resource** | **Link** |
| 40002 | Free Wolfram Alpha Pro | <https://www.imperial.ac.uk/admin-services/ict/self-service/computers-printing/devices-and-software/get-software/get-software-for-students/wolfram-alpha-pro/> |
| 40002 | Linear Algebra Toolkit | <http://www.math.odu.edu/~bogacki/cgi-bin/lat.cgi> |
| 40007 | Functional Dependency Calculator | <http://functionaldependencycalculator.ml/> |
| 40005 | Godbolt Online Compiler | <https://godbolt.org/> |
| 40003 | Logic Crib sheet | <https://www.doc.ic.ac.uk/~imh/teaching/140_logic/Cribsheet.pdf> |
| 40008 | Various algorithms implemented in Haskell | <https://github.com/sorrowfulT-Rex/Haskell-Graphs> |



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God bless our lord and saviour, Steffen with an e. <3