CS2010: Data Structures and Algorithms II

Lecture 0: Intro and Logistics

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Timetable - old

School of Computer Science and Statistics
Integrated Computer Science: Year 2 Timetable 2017-18

Time	Monday	Tuesday	Wednesday	Thursday	Friday
09.00 – 10.00	HT: CS2022: Lect LB04	MT: CS2010: Lab ICT1/2 HT:CS2022: Lect / Lab LB04/LG35/36		MT: CS2010 Lab: ICT 1/2 (Gr B) 1hr only-9am-10am MT: CS2010: Lect Goldhall (10-11)	HT: CS2010: Lect LB08
10.00 – 11.00	MT: CS2041: Lect LB01 (2 hours) HT: CS2021: Lect LB04		MT:CS2010: Lect LB08 HT: CS2016: ICT Lab LG12	HT: CS2016: Lab LG12 (2 hours)	MT: CS2031: Lect: LB01(2hrs)
11.00 – 12.00	MT: CS2041: Lect LB01 HT: CS2022: Lect LB08/LG35/36	HT: CS2022: Lect/Lab: McNeil/ LG35/36	HT: MA2C03: Lect LB04	MT: CS2041: Lect LB01 HT: CS2021: Lect LB08	MT: CS2031: Lect: LB01 HT: CS2021: Lect LB04
12.00 – 13.00	HT: CS2021: Lab LG35/36 (3 hours)	HT: CS2016: Lect LB01		MT: CS2014: Lab LG12 HT: CS2010: Lab ICT 2	
13.00 – 14.00	MT:MA2C03: Lect LB08 HT: CS2021: Lab LG35/36	HT: CS2013: Lect LB01 /M20	MT: CS2014: Lect LB08	MT: CS2014: Lab LG12 HT: CS2010: Lect LB04/Lab ICT 2	MT: CS2031: Tut: LB01 HT: MA2C03: Lect LB04
14.00 – 15.00	HT: CS2021: Lab LG35/36			MT: CS2014: Lab LG12	MT:MA2C03: Lect LB01
15.00 – 16.00	MT: CS2010: Lect Joly HT: CS2021: LB04	MT: CS2014: Lect LB01			
16.00 – 17.00	MT: CS2031: Lab ICT 1/2 HT: CS2010: Lect Goldhall	MT: CS2031: (1hr 4pm–5pm) Lab ICT Lab 1/2 HT: CS2010: Lab ICT Lab 1/2 (2 hrs)	HT: MA2C03: Lect MacNeil	HT: CS2022: Lect MacNeil	
17.00 – 18.00	HT: CS2016: Lect LB01	MT: MA2C03: Lect LB04 HT: CS2010: Lab ICT Lab 1/2	HT: CS2016: Lect LB01	HT: Lect CS2010: MacNeil	

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Labs – Hilary Term

- ICT LABS 1 and 2, Tuesday 4-5 and 5-6
- No labs in week 1
- First lab session on Tuesday January 23rd
- Groups will be posted on blackboard
- Any issues – email your TA Aimee bordaa@tcd.ie

Lectures – Hilary Term

- Monday 4-5 Goldhall
- Thursday 1-2 LB04
- Friday 9-10 LB08

- Reading week – Feb 26th – March 2nd – no lectures or labs
- Also no lectures on March 19th (bank holiday), March 30th (Good Friday), and April 2nd (Easter)
- Last day of lectures: April 6th

- Attendance taken

Course Material

- **Algorithms,** 4th Edition by Robert Sedgewick and Kevin Wayne
- Lecture notes and assignments will be posted on Blackboard https://tcd.blackboard.com/
- Assignments
  - Submission both through Web-CAT and Blackboard
  - Marking through Web-CAT http://webcat.scss.tcd.ie/cs2012/WebObjects/Web-CAT.woa (only accessible from college network – use VPN to connect from home)

Assignments

- 3 assignments, total coursework 35%
- Deadlines
  - No extensions (apart from medical cert, note from tutor)
  - Late submissions, mark docked 20% per day
- Plagiarism – all submissions will be run through Jplag
- To get additional help:
  - From the demonstrators - come to lab sessions
  - Undergraduate Programming Centre
    https://www.scss.tcd.ie/misc/ugpc/

Questions, feedback etc

- Lecturer ivana.Dusparic@scss.tcd.ie
- TA bordaa@tcd.ie
- Talk to me before/after class
- Evaluation at the end of the module
- Class reps?
- Anonymous feedback? Notes to share with the class?
  - use a Padlet https://padlet.com/ivana_dusparic/5j4cfgbuh1ff
    password: cs2010

So what are we actually going to learn?

Course content - Review and expand

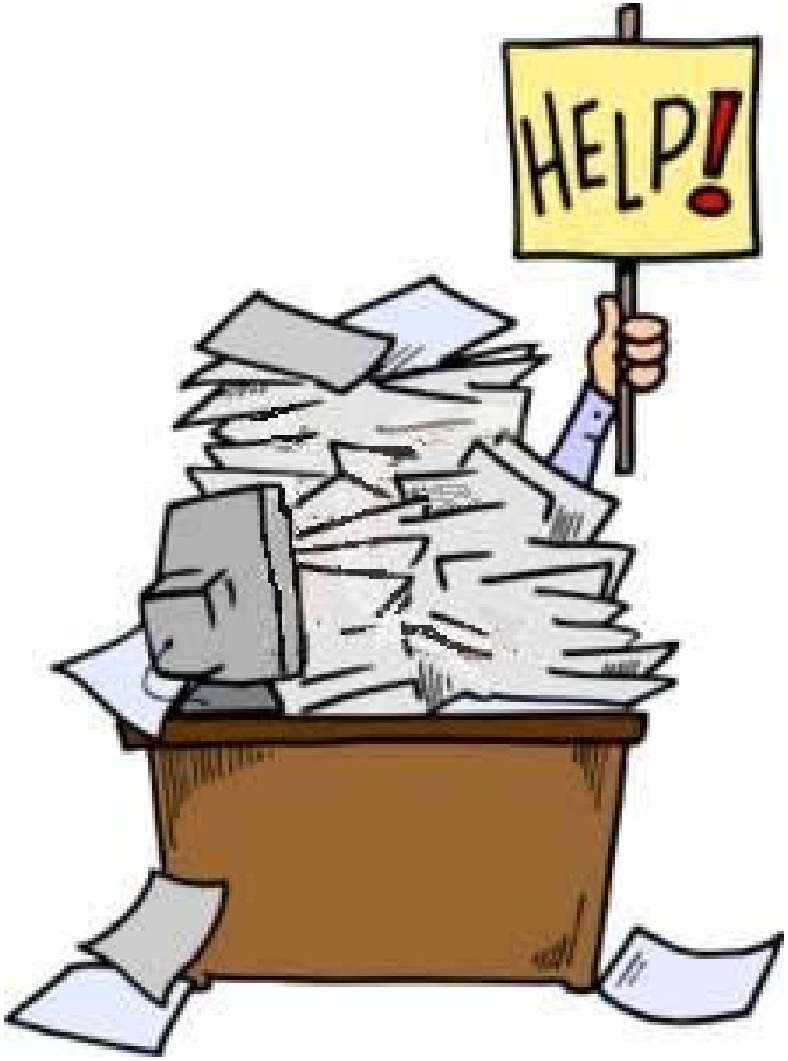
- Sorting algorithms
  - Insertion sort, heapsort ✓
  - Selection sort, shellsort, mergesort, quicksort
  - Space and time trade offs
  - Select and compare based on input type and size
- Algorithmic approaches
  - Brute force, exhaustive search, decrease and conquer, divide and conquer, greedy, dynamic programming ...
- Trees
  - 2-3, red-black search trees ✓
  - B-trees, B*

Course content - Review and expand

- Graphs – shortest path
  - Dijkstra ✓
  - Depth-first, breadth-first search, Prim, Kruskal, Topological sort
  - Shortest paths - Bellman-Ford, Floyd-Warshall
  - What to use based on graph – directed, undirected, acyclic, negative edge weights etc

Course content – New Topics

- Strings
  - String sorts
  - Substring search
  - Data compression
- Dynamic programming
  - Solve by combining the solutions to subproblems – where subproblems overlap, ie subproblems share subsubproblems … (vs divide and conquer where subproblems are disjoint)
- Network flow algorithms
  - Maxflow, Ford-Fulkerson
- Intractability
- P vs NP, NP-completeness


HELP!

Tools

- Blackboard. Web-CAT
- Eclipse, Junit

- Version control - Git?
  - Github, bitbucket, gitlab
  - gitlab.scss.tcd.ie

- TurningPoint?
  - Download Android or iPhone app or use browser to access polls
  - https://play.google.com/store/apps/details?id=com.turningTech.Responseware&hl=en
  - https://responseware.turningtechnologies.eu/responseware/session/index/128764
    - (128764 – unique session id for every session)
    - Ignore user id details, just press JOIN