Course Admin

IT5003: Data Structures and Algorithms

(**AY2019/20 Semester 1**)

Teaching Staff

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Outline

- Module Overview
- Objectives
- Resources
- Weekly Structure
- Assessments

Module Overview: Objectives

- This module introduces non-computing students to efficient computational problem solving in an **accelerated pace**
- Students will learn to:
  - Formulate a computational problem, identify the data required and come up with appropriate data structures to represent them, and apply known strategies to design an algorithm to solve the problem.
  - Quantify the space and time complexity of an algorithm, prove the correctness of an algorithm, and the limits of computation

Module Overview: Topics

- Topics:
  - Common **data structures** and their **algorithms** (lists, hash tables, heap, trees, graphs),
  - Algorithmic problem solving paradigms (greedy, divide and conquer, dynamic programming)
  - NP-completeness

- The "Architecture" of IT5003
  1. Data structures
  2. Algorithms

The Two Pillars in IT5003

Data Structure

- Ways to organize large collection of data
- Covers **Lists**, **Stack**, **Queue**, **Tree**, **Heap**, **Hash Table**, **Graph**

Algorithm

- Well known steps to solve certain problems
- Covers **Sorting**, **Hashing**
- Related topics: **Algorithm Analysis**, **Recursion**

Topic Schedule (Tentative!)

Week	Topic
1 (10th October)	1. Algorithm Analysis 2. Sorting
2 (17th October)	3. ADT 4. List ADT – Array + Linked List
3 (24th October)	5. Stack ADT 6. Queue ADT
4 (31st October)	7. Recursion 8. Tree, Binary Tree
5 (7th November)	9. BST 10. AVL Tree
6 (14th November)	11. Priority Queue & Heap
7 (21st November)	12. Hash Table
8 (28th November)	13. Graph

Resources : **Web Portals**

- **Luminus:**
  - Only for gradebook
- **Coursemology:**
  - Materials
  - Forum
  - Exercise
  - Practical Exam(s)
- **Archipelago:**
  - Interaction

Weekly Structure

1. **Lecture Part A:**
   - ❑ Thursday 6.30pm to ~8.15pm
   - ❑ LT14
2. **Lecture Part B:**
   - ❑ Saturday 9am to ~9.45am
   - ❑ Seminar Room @ LT19 (beside LT19)
   - ❑ May skip in some weeks: Then tutorial / lab starts at 9am
   - ❑ By default: have lecture part B on most weeks
3. **Tutorial / Lab:**
   - ❑ Saturday 10am to 12pm (if there is lecture part B)
   - ❑ Saturday 9am to 12pm (if there is NO lecture part B)

Assessment: Overview

- **CA 50%**
  - Midterm **20%**
    - Tentatively 9th November (during tutorial / lab)
  - Practical Exam **20%**
    - Tentatively 30th November (during tutorial / lab)
  - "Lab" exercises **10%**
- **Final Exam (Open Book) 50%**
  - Scheduled on **7th December 9am – 11am**

Assessment: **Tutorial + Lab Hybrid**

- Weekly 2 hours tutorial + lab session:
  - Discuss tutorial questions
  - Discuss / hands-on for lab questions
    - Have a bit of free time for you to attempt / finish the lab questions
  - Your TA == Tutorial + Lab TA
  - Submit chosen exercise(s)
    - 6 submissions (2% each) = **12% (capped at 10%)**

Summary and advice

- The labs exercise and PE concentrates more on your programming skill:
  - Ability to translate idea into actual program
- Midterm and final exam focus more on your problem solving skill:
  - Ability to understand and reason about the problem
  - Ability to apply your knowledge to formulate solution
- You need to spend time on:
  - Actually coding to improve your skill
  - Thinking hard about the content of the lectures as memorization does not help