Maynooth University
National University of Ireland Maynooth

CS211FZ, 2021-22

Data Structures and Algorithms (II)

Dr. Dapeng Dong

Module Overview

1. Fundamentals and implementation of Binary Search Trees, Balanced Search Trees, Tree traversals, various sorting algorithms, graphs and Hash tables

2. Algorithm analysis: upper and average complexity bounds, best, average and worst-case algorithm behaviour

3. Algorithm strategies: brute force, greedy, divide and conquer and backtracking algorithms

4. Selected advanced topics in Algorithms and Data Structures

Learning Outcomes

On successful completion of the module, students should be able to:

- describe a variety of structures for storing data such as binary search trees, balanced trees and hash tables
- understand various searching algorithms and be able to analyse their performance
- outline a range of algorithms in the areas of data compression, cryptography and graph theory
- apply knowledge of algorithm complexity and data structuring techniques to problem solving

Teaching & Learning Methods

Delivery methods	**Hours**
Lectures	24
Labs / Practicals	24
Tutorials	0
Planned learning activities	0
Independent student activities	77
Total	125

Assessment

Assessment type	Weighting	Duration
Continuous Assessment	50%	
Bi-weekly lab assignments (8)	40%	
Lab-based examination (1)	10%	120 minutes
Written examination	50%	120 minutes
Other	0%	
Total	100%	

Pass standard: 40%

Penalties & Repeat Exams

- Penalties (for late submission of Course/Project Work etc.): Work which is submitted late shall be assigned a mark of zero (or a Fail Judgement in the case of Pass/Fail modules).

- Requirements for Supplemental Examination: 120 minutes paper to be taken in Autumn 2022. The mark for Continuous Assessment is carried forward.

Information

Lecturers:	Dr. Dapeng Dong & Dr. Hadi Tabatabaee
Emails:	dapeng.dong@mu.ie & hadi.tabatabaee@mu.ie
Office:	106, MIEC Building
Module materials:	Moodle Website, CS211FZ https://moodle.maynoothuniversity.ie/course/
Lectures:	CSSE Monday (15:50PM – 16:35PM & 16:45PM – 17:30PM) RIDS & MMWD Monday (19:00PM – 19:45PM & 19:55PM – 20:40PM)
Labs:	Starting from Week 4 Friday, 14:00 – 17:30, Computer Science Building

Reading List

- Textbooks
  - Weiss, M. A. (2012). *Data structures and algorithm analysis in Java*. Pearson Education, Inc.
  - Cormen, T. H., Leiserson, C. E., Rivest, R. L., & Stein, C. (2009). *Introduction to algorithms*. MIT press.
  - Lafore, R. (2017). *Data structures and algorithms in Java*. Sams publishing.

- Useful links
  - Oracle Java Tutorial: https://docs.oracle.com/javase/tutorial/
  - Using Eclipse: https://www.eclipse.org/getting_started/

Software

- Programming language
  - Java OpenJDK, version 11 (Java SE 11)
    - https://jdk.java.net/java-se-ri/11

- The Integrated Development Environment (IDE)
  - Eclipse IDE for Java Developers
    - https://www.eclipse.org/downloads/packages/