CS211
Algorithms & Data Structures

Induction

Fall 1443 - 2021
Dr.Sameer Mabrouk Alrehaili
College of Science and Computer Engineering, Yanbu

Algorithms & Data Structures CS 211

Contact Information

- **Instructor**:
  - Dr. Sameer M. Alrehaili
- **Email**: srehaili@taibahu.edu.sa
- **Lectures**:
  - CSNB2 Sun and Tue 09:45 - 11:25
  - ISNB1 Mon and Wed 08:00 - 09:40
  - ISNB2 Mon and Wed 09:45 - 11:25
- **Office hours:**
  - Monday 11:30 - 13:30
  - Tuesday 11:30 - 13:30

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Course Overview

Having successfully completed this course, the student will be able to:

- Develop an appreciation of the relationship between data structures and algorithms.
- Examine and experiment a variety of techniques for designing algorithms.
  - To help you to estimate the running time.
  - To help you to write an efficient algorithm.
  - Compare the running time for two algorithms
  - To analyse an algorithm
- Select and implement data structures for a given problem.
- Distinguish, differentiate and experiment different searching and sorting algorithms.
- Explore the concept of an abstract data types (ADT) and the tradeoffs between different implementations of ADTs.

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Course Description

Data structures and algorithms are fundamental to programming and to understanding computation. The purpose of this module is to provide students with a coherent introduction to techniques for using data structures and commonly used algorithms for solving problems. The course is taught using the Java or Python programming language.

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Expectations

- Attend all lectures
- Complete all labs
- Solve given problems
- Submit lab work and assignment through

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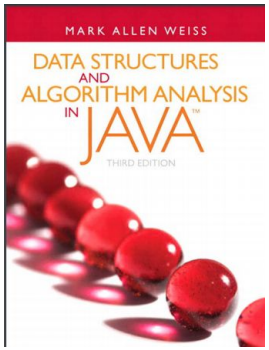
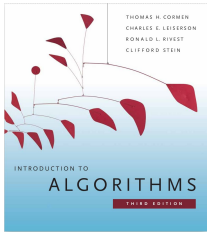
Learning resources

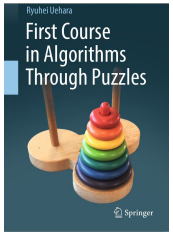
Textbooks:



- Mark A. Weiss, “Data Structures and Algorithm Analysis in Java”, 3rd Edition, Addison Wesley, 2011, ISBN 13: 9780-13-257627-7.

References:





- Thomas Cormen, Charles Leiserson, Ronald Rivest, and Clifford Stein, “Introduction to algorithms”, 3rd Edition, MIT Press, 2009, ISBN 978-0-262-53305-8.
- Ryuhei Uehara, “First Course in Algorithms Through Puzzles”, Springer, 2019, ISBN 978-981-13-3187-9.
- Adam Drozdek, Data Structures and Algorithms in Java, 4th Edition, Cengage Learning, 2013.

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Topics Covered

Lectures:	Laboratories:
1. Introduction to algorithms and data structures 2. Algorithm/complexity analysis 3. Recursion 4. Lists, linked lists 5. Stacks, queues 6. Trees (Trees, Sets, Maps, Graphs) 7. Graph algorithms (Shortest-path, Dijkstra, ...) 8. Searching and Sorting algorithms.	1. Introductory and problems review 2. Recursion 3. List, linked list 4. Stack, queues 5. Trees 6. Graph algorithms 7. Searching and sorting algorithms.

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Weekly Plan (schedule)

Week	Date	Topic	Activity
Week#01	29 Aug, 02 Sep	Introduction I	
Week #02	05 Sep, 09 Sep	Introduction II	
Week#03	12 Sep, 16 Sep	Complexity Analysis I	
Week#04	19 Sep, 23 Sep	Complexity Analysis II	**Quiz1**
Week#05	26 Sep, 30 Sep	Arrays & Searching	
Week#06	03 Oct, 07 Oct	Sorting	
Week#07	10 Oct, 14 Oct	Recursion	**Midterm**
Week#08	17 Oct, 21 Oct	Linked Lists	
Week#09	24 Oct, 28 Oct	Stacks	
Week#10	31 Oct, 04 Nov	Queues	**Quiz2**
Week#11	07 Nov, 11 Nov	Trees	
Week#12	14 Nov, 18 Nov	Review	

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Grading

• Assignments & Participation	10%
• Quiz 1 (Week 4)	10%
• Quiz 2 (Week 10)	10%
• Midterm (Week 7)	30%
• Final (Week 13)	40%