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.
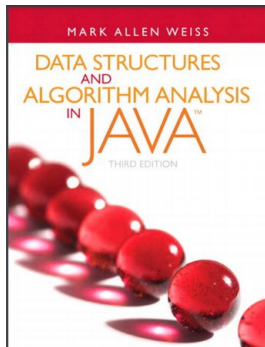
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Expectations

- Attend all lectures
- Complete all labs
- Solve given problems
- Submit lab work and assignment through
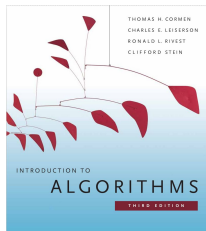
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Learning resources
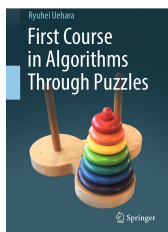
Textbooks:

- 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	Ch1:Introduction	
Week #02	05 Sep, 09 Sep	Ch2:Algorithm Analysis	
Week#03	12 Sep, 16 Sep	Ch3:Lists, Stacks, and Queues	
Week#04	19 Sep, 23 Sep	Ch3:Lists, Stacks, and Queues	**Quiz1** (Wed, Thur)
Week#05	26 Sep, 30 Sep	Ch4:Trees	
Week#06	03 Oct, 07 Oct	Ch4:Trees	
Week#07	10 Oct, 14 Oct	Ch5:Hashing	
Week#08	17 Oct, 21 Oct	**Midterm**	**Midterm** (Sun, Mon)
Week#09	24 Oct, 28 Oct	Ch5:Hashing	
Week#10	31 Oct, 04 Nov	Ch7:Sorting	(Thur)
Week#11	07 Nov, 11 Nov	Ch7:Sorting	
Week#12	14 Nov, 18 Nov	Ch9:Graphs	**Quiz2**
Week#13	21 Nov, 25 Nov	Ch9:Graphs	
Week#14	28 Nov, 02 Dec		(holiday)
Week#15	05 Dec, 09 Dec	Ch10:Design Techniques	
Week#16	12 Dec, 16 Dec	Ch10:Design Techniques	Last IC-j
Week#17	19 Dec, 23 Dec	Final Exam Week	(sun)
Week#18	20 Dec, 30 Dec	Final Exam	
Week#19	02 Jan, 06 Jan	Final Exam	

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Grading

- Assignments & Participation   10%
- Quiz 1 (Week 4)   5%
- Quiz 2 (Week 12)   5%
- Midterm (Week 8)   30%
- Final lab exam   10%
- Final   40%