

KA310- [CS-261]

## アルゴリズムの設計と解析

黄潤和

必修区分： | 配当年次/単位：年次/単位 | 開講時期：

## 【授業の概要と目的 (何を学ぶか)】

管理 ID : 1706755  
授業コード : J0336

The goal of this course is to enhance students' knowledge of data structure and skill of applying associated algorithms. This course will cover the content review of learned data structures and algorithms related tree and graph, and plus algorithm analysis and design techniques.

## 【到達目標】

The objectives of this course are to make students firmly laying good foundation of data structures and algorithms, and one-step further comprehensively understanding algorithm analysis and having design skills and techniques as genral problem solving strategies.

## 【授業の進め方と方法】

- Review some parts of the content about data structures and algorithms learned previously
- Introduce some contents on algorithm analysis techniques
- Learn some design techinques for problem solving

## 【授業計画】

回	テーマ	内容
1	Review data structures and algorithms (1)	Tree structures -concepte, terms
2	Review -basic tree algorithm	Search tree -algorithms and analysis -demo
3	Other Trees (1)	2-3-4 Tree -algorithms and analysis -demo
4	Other Trees (2)	Red-Black tree -algorithms and analysis -demo
5	Review data structures and algorithms (2)	Graphs -concepts, terms, -applications
6	Shortest path problems	Weighted graph -one-point shortest path algorithm problem -all-pairs shortest paths algorithm problem
7	Basic graph	DFS and BFS -properties -analysis -demo
8	Mid-term exercises	Work in class -do exercises -explain solutions
9	Single-source shortest path algorithm	-concepts -terms -Dijkstra's algorithm
10	All-pairs shortest paths algorithms	algorithms and analysis -multiplication -Floyd-Washall algorithm
11	Minimal spanning trees	MST algorithms -Prim's algorithm -Kruskal's algorithm
12	Graph application	Travel salesman problem
13	Decision Tree	Decision tree algorithms - for sorting - for searching
14	Limitations of algorrtihm power	- P and NP problems - NP-complete problems

15 Final review Summary of what learned so far

## 【授業時間外の学習 (準備学習・復習・宿題等)】

Read related contents and topics from the Internet

## 【テキスト (教科書)】

"Introduction to The design and Analysis of Algorithms", Anany Levitin, Publisher: Pearson, ISBN-13: 978-0-13-231681-1

## 【参考書】

書名: Introduction to Algorithms, Third Edition  
著者: Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein  
出版社: The MIT Press  
出版年: 2009 年

## 【成績評価の方法と基準】

中間課題 (20%) と定期試験 (80%)

## 【学生の意見等からの気づき】

Interested in students' requirements