Faculty of Applied Sciences

SINF1121   Algorithmics and data structures

[30h+30h exercises] 5 credits

This course is taught in the 1st semester

Teacher(s):   Pierre Dupont
Language: French
Level: First cycle

Aims

- To design correct and efficient algorithms to solve well specified computational problems.
- To motivate the choice of appropriate data structures and algorithms.
- To implement data structures and algorithms in Java in a professional way.
- To apply object-oriented programming principles such as genericity, data abstraction, composition and reusability.
- To work efficiently in teams for the analysis, design, programming and documentation of the proposed solutions.

Main themes

- Computational complexity
- Specifications and object-oriented design
- Basic data structures (lists, trees, binary search trees): study of their abstract properties, practical representations, concrete applications and associated algorithms
- Introduction to data structures design pattersn
- Advanced data structures and algorithms: hash tables, heaps, balanced search trees, text processing techniques, dictionaries, graph representation and processing

Content and teaching methods

- Computational complexity
- Trees, binary search trees, AVL trees, multi-way search trees
- Dictionaries and hash tables
- Priority queues and heaps
- Graphs
- Text processing (suffix trees, pattern matching, compression algorithms)
- Design patterns in Java
Teaching method:
- problem based learning

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

- Prerequisites

(1) Significant programming experience in an object-oriented language such as Java and knowledge of elementary data structures (stacks, queues, lists)

OR

(1) LINF1150 Introduction à l'algorithmique et la programmation: 1ère partie B. LeCharlier

(2) LINF1251 Introduction à l'algorithmique et à la programmation : 2ème partie P. VanRoy

OR

(1) FSAC1650 Informatique T6

- References

(1) Goodrich et Tamassia, "Data Structures and Algorithms in Java, Third Edition" , John Wiley & Sons, 2004.

(2) Cormen T.H. et al. , "Introduction to Algorithms, Second Edition" , MIT Press, 2001. Brassard G. & Bratley P., "Fundamentals of Algorithms" , Prentice Hall, 1996.

- Modalités d'organisation

(1) Evaluation during the whole year

(2) Written exam at the end.

- Remarque:

Course Web Site: http://www.info.ucl.ac.be/notes_de_cours/LINF2121/

Other credits in programs

ECGE3DS/SC	Diplôme d'études spécialisées en économie et gestion (Master in business administration) (Supply Chain Management)	(5 credits)	Mandatory
FSA13BA	Troisième année de bachelier en sciences de l'ingénieur, orientation ingénieur civil	(5 credits)	
MAP22	Deuxième année du programme conduisant au grade d'ingénieur civil en mathématiques appliquées	(5 credits)	
MAP23	Troisième année du programme conduisant au grade d'ingénieur civil en mathématiques appliquées	(5 credits)	
SINF13BA	Troisième année d'études de bachelier en sciences informatiques	(5 credits)	Mandatory
SINF1PM	Année d'études préparatoires au master en sciences informatiques (60 et 120)	(5 credits)	Mandatory