Faculty of Applied Sciences

LINF2121   Algorithmics and data structures

[30h+30h exercises] 5 credits

This course is taught in the 1st semester

Teacher(s):   Pierre Dupont (coord.), Baudouin Le Charlier, Kim Mens
Language: French
Level: Second 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/

Programmes in which this activity is taught

ECGE3DS/IG	Diplôme d'études spécialisées en économie et gestion (informatique de gestion - Master in Information Systems)
ECGE3DS/SC	Diplôme d'études spécialisées en économie et gestion (Master in business administration) (Supply Chain Management)
INFO2	Ingénieur civil informaticien
LINF2	Licence en informatique
LING2MS	Master en linguistique, à finalité spécialisée en ingénierie linguistique

Other credits in programs

ECGE3DS/IG	Diplôme d'études spécialisées en économie et gestion (informatique de gestion - Master in Information Systems)	(5 credits)	Mandatory
ECGE3DS/SC	Diplôme d'études spécialisées en économie et gestion (Master in business administration) (Supply Chain Management)	(5 credits)	
INFO21	Première année du programme conduisant au grade d'ingénieur civil informaticien	(5 credits)	Mandatory
LINF21	Première licence en informatique	(5 credits)	
LINF21/GN	Première licence en informatique (informatique générale)	(5 credits)	Mandatory
LINF21/GS	Première licence en informatique (informatique de gestion)	(5 credits)	Mandatory
LING2MS	Master en linguistique, à finalité spécialisée en ingénierie linguistique	(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)	
MATH21/G	Première licence en sciences mathématiques (Général)	(5 credits)	