Program	Type of studies (cycle)	Third cycle
	Name of the program	SEE Doctoral Studies in Mathematical Science

Course

Course title	**Algorithms and data structures II**

Course code	Semester	Course status	ECTS credits	Contact hours
	I		10	30

Teaching staff	Teacher	Prof. Dr. dipl. ing. Gundolf Haase
	Other staff	

Course goals	The main goal of the course is to acquire knowledge about the choice of the appropriate data structures and algorithms for given problem descriptions with respect to complexity, memory requirements and hardware related issues. Course contains exercises to each item such that the students develop practical skill concerning specified topics in the chosen programming language. The ideas and concepts will be realized on a PC in C++ or JAVA using available container classes (STL) from these programming languages. Special emphasis will be given to performance of the structures on recent hardware.

Course content/topics

- Introduce vector, list, stack, queue, tree wrt. parallelism
- Complexity of algorithms wrt. data structure, e.g., accessing, sorting
- Hashing functions
- Realization in C/C++ (STL), C/Java
- Object oriented programming (C++, Java)
- Data structures and performance: complexity, memory hierarchies, and cache aware data structures
- Code examples on PCs taking into account cache, vector units of recent CPUs

LITERATURE

[1] M. T. Goodrich and R. Tamassia, Algorithm Design: Foundations, Analysis and Internet Examples, Wiley, 2003.

[2] M. T. Goodrich and R. Tamassia, Data Structures and Algorithms in Java, Wiley, 4 edition, 2006.

[3] M. T. Goodrich, R. Tamassia, and D. M. Mount, Data Structures and Algorithms in C++, Wiley, 2003.

[4] J. L. Hennessy and D. A. Patterson, Computer Architecture: A Quantitative Approach, Morgan Kaufmann Publishers, 3rd edition, 2003.

[5] L. Null and J. Lobour, The Essentials of Computer Organization and Architecture, Jones and Bartlett, 2003.

[6] L. T. Yang and M. Guo, High-Perfomance Computing: Paradigm and Infrastructure, Wiley, 2005.

Grading

	Criterion	Points	Cut-off points
1.	Written assignment	20	11
2.	Project	40	22
3	Final exam	40	22
	Total	100	55