Technische Universität München
Lehrstuhl für Informatik V
Dr. T. Neckel, D. Pflüger
G. Buse, K. Unterweger

SS 2010
leaflet

Algorithms of Scientific Computing

General Information

Dates

- **Lecture:** Tuesday 10:15-11:45 and Thursday 10:15-11:45, room MI 02.07.023;
- **Exercise:** Wednesday 10:15-11:45, room MI 02.07.023

Classification

- **Studienfach Informatik:** (Modul IN2001, 4+2 SWS, 8 ECTS)
  - Diplom/Hauptstudium: Wahlpflichtfach theoretische Informatik
  - Master Informatik: Elective course in subject area „Algorithms and Scientific Computing“ (Wahlfach im Fachgebiet „Algorithmen und Wissenschaftliches Rechnen“)
  - Bachelor Informatik/Wirtschaftsinformatik: Wahlfach
- **Studienfach Physik:** „nichtphysikalisches Wahlfach“
- **Studienfach Maschinenbau:** Modul Numerische Simulation
- **Studienfach Mathematik** (und alle anderen Studienfächer): Wahlfach – bitte klären Sie die genaue Einordnung mit dem jeweiligen Prüfungsschriftführer ab.

Topics of the Lecture

The following topics will be covered presumably:

Fast Fourier Transform: (Neckel/Unterweger)
: Discrete (DFT) and fast Fourier transform (FFT) and their derivation and implementation; variants of DFT/FFT such as FCT (Fast Cosine Transform), real-valued FFT; example applications: compression of video and audio data, usage of FFT for a Fast Poisson Solver.

Hierarchical and recursive methods: (Pflüger/Buse)
: Numerical integration following Archimedes; hierarchical bases for one- and d-dimensional problems; cost-benefit ratio for sparse grids; algorithms for sparse grids; outlook on wavelets; multigrid methods for the efficient solution of linear systems of equations.

Space-filling curves: (Neckel/Unterweger)
: Definition, construction, and properties of space-filling curves including different variants of implementation; example applications: parallelisation, construction of inherently cache-efficient algorithms.

Exam

There will be a written exam (Semestralklausur) at the end of the summer term (date t.b.a.). The exam counts (depending on the degree programme) as a course-related exam or as the prerequisite for a „Schein“. Please note the respective conditions and deadlines of your degree programme. The assignments of the exam will be based on the exercises in terms of type and difficulty.

Website of the Lecture

Under

`http://www5.in.tum.de/wiki/index.php/Teaching`,

there is a (long) link to the lecture, where information as well as recent news will be published. Besides, the exercise sheets, slides, and other course material will be available there.

Tobias Neckel
Dirk Pflüger