Part I

Organizational Matters

- ▶ Modul: IN2003
- ▶ Name: "Efficient Algorithms and Data Structures"
  "Effiziente Algorithmen und Datenstrukturen"
- ▶ ECTS: 8 Credit points
- ▶ Lectures:
  - ▶ 4 SWS
    Mon 10:15-11:45 (Room 00.13.009A)
    Thu 10:15-11:45 (Room 00.04.011, HS2)
- ▶ Webpage: http://www14.in.tum.de/lehre/2012WS/ea/

- ▶ Required knowledge:
  - ▶ IN0001, IN0003
    "Introduction to Informatics 1/2"
    "Einführung in die Informatik 1/2"
  - ▶ IN0007
    "Fundamentals of Algorithms and Data Structures"
    "Grundlagen: Algorithmen und Datenstrukturen" (GAD)
  - ▶ IN0011
    "Basic Theoretic Informatics"
    "Einführung in die Theoretische Informatik" (THEO)
  - ▶ IN0015
    "Discrete Structures"
    "Diskrete Strukturen" (DS)
  - ▶ IN0018
    "Discrete Probability Theory"
    "Diskrete Wahrscheinlichkeitstheorie" (DWT)

The Lecturer

- ▶ Harald Räcke
- ▶ Email: raecke@in.tum.de
- ▶ Room: 03.09.044
- ▶ Office hours: (per appointment)

Tutorials

- ‣ Tutor:
  - ‣ Chintan Shah
  - ‣ chintan.shah@tum.de
  - ‣ Room: 03.09.059
  - ‣ Office hours: Wed 11:30–12:30
- ‣ Room: 00.08.038
- ‣ Time: Tue 14:14–15:45

Tutorials

- ‣ Tuesday 14:15-15:45 (MI 00.08.038)
- ‣ Wednesday 10:15-11:45 (MI 03.11.018)
- ‣ Thursday 12:30-14:00 (MI 03.11.018)
- ‣ Friday 12:15-13:45 (MI 00.13.009A)

Assignment sheets

- ‣ In order to pass the module you need to
  1. pass an exam, and
  2. at least 40% of the points in the assignment sheets.

Assessment

- ‣ Assignment Sheets:
  - ‣ An assignment sheet is usually made available on Wednesday on the module webpage.
  - ‣ Solutions have to be handed in in the following week before the lecture on Thursday.
  - ‣ You can hand in your solutions by putting them in the right folder in front of room 03.09.052.
  - ‣ Solutions have to be given in English.
  - ‣ Solutions will be discussed in the subsequent tutorial on Tuesday.
  - ‣ You can submit solutions in groups of up to **3** people.
  - ‣ The next assignment shee has to be handed in on Monday 12 November.

1 Contents

- ▶ Foundations
    - ▶ Machine models
    - ▶ Efficiency measures
    - ▶ Asymptotic notation
    - ▶ Recursion
- ▶ Higher Data Structures
    - ▶ Search trees
    - ▶ Hashing
    - ▶ Priority queues
    - ▶ Union/Find data structures
- ▶ Cuts/Flows
- ▶ Matchings

2 Literatur

📄 Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman:
The design and analysis of computer algorithms,
Addison-Wesley Publishing Company: Reading (MA), 1974

📄 Thomas H. Cormen, Charles E. Leiserson, Ron L. Rivest,
Clifford Stein:
Introduction to algorithms,
McGraw-Hill, 1990

📄 Michael T. Goodrich, Roberto Tamassia:
*Algorithm design: Foundations, analysis, and internet
examples,*
John Wiley & Sons, 2002

2 Literatur

📄 Volker Heun:
*Grundlegende Algorithmen: Einführung in den Entwurf und
die Analyse effizienter Algorithmen,*
2. Auflage, Vieweg, 2003

📄 Jon Kleinberg, Eva Tardos:
Algorithm Design,
Addison-Wesley, 2005

📄 Donald E. Knuth:
*The art of computer programming. Vol. 1: Fundamental
Algorithms,*
3. Auflage, Addison-Wesley Publishing Company: Reading
(MA), 1997

2 Literatur

📄 Donald E. Knuth:
*The art of computer programming. Vol. 3: Sorting and
Searching,*
3. Auflage, Addison-Wesley Publishing Company: Reading
(MA), 1997

📄 Christos H. Papadimitriou, Kenneth Steiglitz:
Combinatorial Optimization: Algorithms and Complexity,
Prentice Hall, 1982

📄 Uwe Schöning:
Algorithmik,
Spektrum Akademischer Verlag, 2001

📄 Steven S. Skiena:
The Algorithm Design Manual,
Springer, 1998