Part I

Organizational Matters

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- ▶ Modul: IN2003
- ▶ Name: "Efficient Algorithms and Data Structures"
  "Effiziente Algorithmen und Datenstrukturen"
- ▶ ECTS: 8 Credit points
- ▶ Lectures:
  - ▶ 4 SWS
    Mon 10:00–12:00 (Room Interim2)
    Fri 10:00–12:00 (Room Interim2)
- ▶ Webpage: http://www14.in.tum.de/lehre/2018WS/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: (by appointment)

Tutorials

A01 Monday, 12:00–14:00, 00.08.038 (Lederer)

A02 Monday, 12:00–14:00, 00.09.038 (Stotz)

A03 Monday, 14:00–16:00, 02.09.023 (Lederer)

B04 Tuesday, 10:00–12:00, 00.08.053 (Czerner)

D05 Thursday, 10:00–12:00, 03.11.018 (Stotz)

E06 Friday, 12:00–14:00, 00.13.009 (Czerner)

Assignment sheets

In order to pass the module you need to pass an exam.

Assessment

Assignment Sheets:

▶ An assignment sheet is usually made available on Monday on the module webpage.

▶ Solutions have to be handed in in the following week before the lecture on Monday.

▶ You can hand in your solutions by putting them in the mailbox "Efficient Algorithms" on the basement floor in the MI-building.

▶ Solutions have to be given in English.

▶ Solutions will be discussed in the tutorial of the week when the sheet has been handed in, i.e, sheet may not be corrected by this time.

▶ You should submit solutions in groups of up to **2** people.

Assessment

Assignment Sheets:

▶ Submissions must be handwritten by a member of the group. Please indicate who wrote the submission.

▶ Don't forget name and student id number for each group member.

Assessment

Assignment can be used to improve you grade

Requirements for Bonus

- ▶ 50% of the points are achieved on submissions 2–8,
- ▶ 50% of the points are achieved on submissions 9–14,
- ▶ each group member has written at least 4 solutions.

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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

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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

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2 Literatur

- 📄 Ronald L. Graham, Donald E. Knuth, Oren Patashnik:
  Concrete Mathematics,
  2. Auflage, Addison-Wesley, 1994

- 📄 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, 1997

2 Literatur

- Donald E. Knuth:
  The art of computer programming. Vol. 3: Sorting and Searching,
  3. Auflage, Addison-Wesley, 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