

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 10:30–12:00 (Room Interim2)
 - Fri 10:30–12:00 (Room Interim2)
- ▶ Webpage: <http://www14.in.tum.de/lehre/2014WS/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 Räche
- ▶ Email: raecke@in.tum.de
- ▶ Room: 03.09.044
- ▶ Office hours: (by appointment)

- ▶ Tutors:
 - ▶ Chintan Shah
 - ▶ chintan.shah@tum.de
 - ▶ Room: 03.09.059
 - ▶ Office hours: Wed 11:30–12:30

 - ▶ Dario Frascaria
 - ▶ frascari@in.tum.de
 - ▶ Room: 03.09.035
 - ▶ Office hours: (by appointment)

Tutorials

- ▶ Monday 16-18 (MI 00.08.038)
Chintan
- ▶ Tuesday 14-16 (MI 00.08.038)
Dario
- ▶ Thursday 10-12 (MI 00.08.038)
Dario
- ▶ Friday 12-14 (MI 00.13.009A)
Chintan

Assignment sheets

In order to pass the module you need to pass a 3 hour 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 right folder in front of room 03.09.019A.
- ▶ 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 can submit solutions in groups of up to 3 people.**

Assessment

Assignment can be used to improve you grade

- ▶ If you obtain 50% of the points on the first half **and** 50% on the second half of assignments your grade will improve according to the following function

$$f(x) = \begin{cases} \frac{1}{10} \text{round} \left(10 \left(\frac{\text{round}(3x)-1}{3} \right) \right) & 1 < x \leq 4 \\ x & \text{otw.} \end{cases}$$

- ▶ It will improve by 0.3 or 0.4, respectively.




Examples:

- ▶ 3.3 → 3.0
- ▶ 2.0 → 1.7
- ▶ 3.7 → 3.3
- ▶ 1.0 → 1.0
- ▶ > 4.0 no improvement

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