

# 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 10:15–11:45 (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](mailto:raecke@in.tum.de)
- ▶ Room: 03.09.044
- ▶ Office hours: (per appointment)

- ▶ Tutor:
  - ▶ Chintan Shah
  - ▶ [chintan.shah@tum.de](mailto: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 sheet 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