

## 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 10:15–11:45 (Room Interim2)
- ▶ Webpage:  
<http://wwwmayr.in.tum.de/lehre/2015WS/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: (by appointment)

## Tutorials

- ▶ Monday 12-14 (MI 00.08.038), Chintan Shah
- ▶ Monday 14-16 (MI 00.08.055), Matthias Kohler
- ▶ Monday 16-18 (MI 00.08.036), Julius Kobold
- ▶ Tuesday 12-14 (MI 03.11.018), Julius Kobold
- ▶ Tuesday 14-16 (MI 00.08.038), Dario Frascaria
- ▶ Tuesday, 16-18, (MI 00.08.036), Gregor Matl
- ▶ Wednesday, 10-12, (MI 01.13.010), Matthias Kohler
- ▶ Thursday 10-12 (MI 00.08.038), Dario Frascaria
- ▶ Friday 12-14 (MI 00.13.009A), Chintan Shah
- ▶ Friday 14-16, (MI 00.08.036), Gregor Matl

Die blau markierten Übungsgruppen finden nicht statt!!!

## 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