

# 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:  
<https://www.moodle.tum.de/course/view.php?id=80009>

- ▶ 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

- ▶ Omar AbdelWanis
- ▶ omar.abdelwanis@in.tum.de
- ▶ Room: 03.09.042
- ▶ Office hours: (by appointment)

## Tutorials

### One centralized tutorial session.

Wednesday, 14:00-16:00

<https://tum-conf.zoom.us/j/63875503821>




Meeting ID: 638 7550 3821

Passcode: 719434





## 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

-  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