

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.**

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.

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.





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