Part I

Organizational Matters

- 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)

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
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- Room: 03.09.044
- Office hours: (by appointment)
**Tutorials**

- **A01** Monday, 12:00–14:00, 00.08.038 (Schmid)
- **A02** Monday, 12:00–14:00, 00.09.038 (Stotz)
- **A03** Monday, 14:00–16:00, 02.09.023 (Liebl)
- **B04** Tuesday, 10:00–12:00, 00.08.053 (Schmid)
- **B05** Tuesday, 12:00–14:00, 03.11.018 (Kraft)
- **B06** Tuesday, 14:00–16:00, 00.08.038 (Somogyi)
- **D07** Thursday, 10:00–12:00, 03.11.018 (Liebl)
- **E08** Friday, 12:00–14:00, 00.13.009 (Stotz)
- **E09** Friday, 14:00–16:00, 00.13.009 (Kraft)

**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 can 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.
**Assessment**

Assignment can be used to improve your grade

- If you obtain a bonus your grade will improve according to the following function

\[ f(x) = \begin{cases} \frac{1}{10} \left\lfloor \frac{10\left( \frac{\left\lfloor 3x \right\rfloor - 1}{3} \right)}{x} \right\rfloor & 1 < x \leq 4 \\ othewise \end{cases} \]

- 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

**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.

**Contents**

- Foundations
  - Machine models
  - Efficiency measures
  - Asymptotic notation
  - Recursion
- Higher Data Structures
  - Search trees
  - Hashing
  - Priority queues
  - Union/Find data structures
- Cuts/Flows
- Matchings

**Literatur**

2 Literatur

- Ronald L. Graham, Donald E. Knuth, Oren Patashnik: *Concrete Mathematics*, 2. Auflage, Addison-Wesley, 1994
- Jon Kleinberg, Eva Tardos: *Algorithm Design*, Addison-Wesley, 2005
- Uwe Schöning: *Algorithmik*, Spektrum Akademischer Verlag, 2001