Part I

Organizational Matters

Part I

Organizational Matters

▶ Modul: IN2003

▶ Name: "Efficient Algorithms and Data Structures"
         "Effiziente Algorithmen und Datenstrukturen"

▶ ECTS: 8 Credit points

▶ Lectures:
  ▶ 4 SWS
     Mon 10:15–11:45 (Room 00.13.009A)
     Thu 10:15–11:45 (Room 00.04.011, HS2)

▶ Webpage: http://www14.in.tum.de/lehre/2012WS/ea/

Part I

Organizational Matters

- Modul: IN2003
- Name: "Efficient Algorithms and Data Structures"
  "Effiziente Algorithmen und Datenstrukturen"
- ECTS: 8 Credit points
- Lectures:
  - 4 SWS
    Mon 10:15–11:45 (Room 00.13.009A)
    Thu 10:15–11:45 (Room 00.04.011, HS2)
- Webpage: http://www14.in.tum.de/lehre/2012WS/ea/

Part I

Organizational Matters

- Modul: IN2003
- Name: "Efficient Algorithms and Data Structures"
  "Effiziente Algorithmen und Datenstrukturen"
- ECTS: 8 Credit points
- Lectures:
  - 4 SWS
    Mon 10:15–11:45 (Room 00.13.009A)
    Thu 10:15–11:45 (Room 00.04.011, HS2)
- Webpage: http://www14.in.tum.de/lehre/2012WS/ea/

Part I

Organizational Matters

- Modul: IN2003
- Name: "Efficient Algorithms and Data Structures"
  "Effiziente Algorithmen und Datenstrukturen"
- ECTS: 8 Credit points
- Lectures:
  - 4 SWS
    Mon 10:15–11:45 (Room 00.13.009A)
    Thu 10:15–11:45 (Room 00.04.011, HS2)
- Webpage: http://www14.in.tum.de/lehre/2012WS/ea/

Part I

Organizational Matters

- Modul: IN2003
- Name: "Efficient Algorithms and Data Structures"
  "Effiziente Algorithmen und Datenstrukturen"
- ECTS: 8 Credit points
- Lectures:
  - 4 SWS
    Mon 10:15–11:45 (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)

- ▶ 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)

- ▶ 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)

- 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)

- ▶ 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)

- 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: (per appointment)

Tutorials

- Tutor:
  - Chintan Shah
  - 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.

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.

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 shee has to be handed in on Monday 12 November.

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 shee has to be handed in on Monday 12 November.

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 shee has to be handed in on Monday 12 November.

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 shee has to be handed in on Monday 12 November.

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 shee has to be handed in on Monday 12 November.

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 shee has to be handed in on Monday 12 November.

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 shee has to be handed in on Monday 12 November.

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 shee has to be handed in on Monday 12 November.

1 Contents

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

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

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