

# Theory of Computer Science

## A1. Organizational Matters

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University of Basel

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# Organizational Matters

# People

## Lecturer

Dr. Gabriele Röger

- **email:** `gabriele.roeger@unibas.ch`
- **office:** room 04.005, Spiegelgasse 1

# People

## Tutors

Patrick Ferber

- **email:** `patrick.ferber@unibas.ch`
- **office:** room 04.001, Spiegelgasse 5

Florian Pommerening

- **email:** `florian.pommerening@unibas.ch`
- **office:** room 04.005, Spiegelgasse 1

# Time & Place

## Lectures

- Monday: 13:15–16:00
- Wednesday: 16:15–18:00
- Room 05.002, Spiegelgasse 5

# Time & Place

## Exercise Sessions (starting March 2)

- group 1 (Patrick Ferber; **in German?**)
  - **time:** Monday 16:15–17:00
  - **place:** room 00.003, Spiegelgasse 1
- group 2 (Florian Pommerening; in English)
  - **time:** Monday 16:15–17:00
  - **place:** room U1.001, Spiegelgasse 1

**important:** please send me an email with your preferred language until **Wednesday 23:59** (February 19).

# Revised Course Format



*5 hours of lectures  
every week?!?*

## Revised Course Format



*5 hours of lectures  
every week?!?*

- more hands-on experience during the lectures
- bring pen & paper or tablet
- no increase of content
- overall time unchanged (now 5+1, previously 4+2)



# Theory Course on the Web

## Course Homepage

- course information
- slides
- exercise sheets and additional material

### enrolment:

- <https://services.unibas.ch/>
- **deadline:** March 16
- better today, so that you get all relevant emails

# Course Material

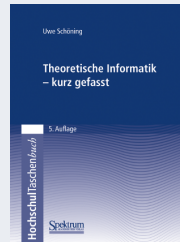
course material:

- slides (online)
- textbooks (see next slides)
- additional material **on request**

# Course Material

## Textbooks (German)

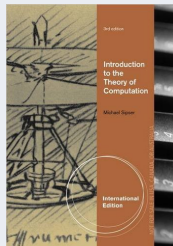
- Logik für Informatiker  
by Uwe Schöning (5th edition)
  - covers the **part on logic**,  
but also advanced topics  
beyond the scope of the course
- Theoretische Informatik – kurz gefasst  
by Uwe Schöning (5th edition)
  - covers **large parts** of the course,  
but not the part on logic



# Course Material

## Textbooks (English)

- Logic for Computer Scientists by Uwe Schöning (1st edition)
  - covers the **part on logic**, but also advanced topics beyond the scope of the course
- Introduction to the Theory of Computation by Michael Sipser (3rd edition)
  - covers **large parts** of the course, but not the part on logic



# Target Audience

## target audience:

- B.Sc. Computer Science, 4th semester
- B.A. Computer Science, 4th or 6th semester as an elective or if interested in M.Sc. Computer Science degree
- all other students welcome

## prerequisites:

- basic proof techniques  
(mathematical induction, proof by contradiction, . . .)
- basic programming skills

# Exam

- **written exam**, 8 ECTS credits
- June 10, 14:00–16:00
- Vesalianum, large lecture hall (EO. 16)
- admission to exam: **no prerequisites**
- must **register** for exam during March 30 – April 14  
    ↪ see <https://philnat.unibas.ch/de/examen/>
- grade for course determined exclusively by the exam
- if you fail: **one** repeat attempt in FS 2021

# Exercises

## Exercise sheets (homework assignments):

- mostly theoretical exercises
- some programming exercises

## Exercise sessions:

- (live exercises)
- questions about exercise sheets
- questions about the course
- participation voluntary but recommended

# Exercises

- exercise sheets on course homepage every Wednesday
- may be solved in **groups of arbitrary size** (recommended: 2–3)
- due Wednesday the following week  
(upload to Adam at <https://adam.unibas.ch/>)
- scans must be legible (no photos, please)
- we appreciate  $\text{\LaTeX}$  submissions



# Questions on Organization



Questions?

# About this Course

# Content: Theoretical foundations of computer science

- A. **background**
  - ▷ mathematical foundations and proof techniques
- B. **logic** (Logik)
  - ▷ How can knowledge be represented?  
How can reasoning be automated?
- C. **automata theory and formal languages**  
(Automatentheorie und formale Sprachen)
  - ▷ What is a computation?
- D. **Turing computability** (Turing-Berechenbarkeit)
  - ▷ What can be computed at all?
- E. **complexity theory** (Komplexitätstheorie)
  - ▷ What can be computed efficiently?
- F. **more computability theory** (mehr Berechenbarkeitstheorie)
  - ▷ Other models of computability

# Learning Goals

- understanding the **capabilities and limitations** of computers
- working with **formal systems**
  - comprehending formal **definitions and theorems**
  - **precise formulation** of definitions, theorems and proofs
  - analyzing formal problems **precisely**
  - differentiating statements **within a system**  
from statements **about a system**

# Warning

“Wer’s nicht gewohnt ist,  
für den ist es ungewohnt.”  
(Prof. Dr. Th. Ottmann)  
[If you are not used to it,  
it may be unusual for you.]



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What can you do?

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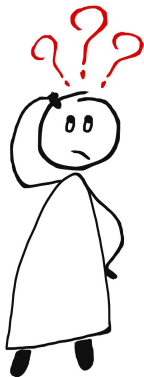
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What can you do?

- stay on the ball
- do the exercises
- pay attention to details
- ask questions!

# Questions about the Course



Questions?