

# Complexity Theory

VU 181.142, WS 2020

## 1. General Information

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# Outline

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  - 1.2 Prerequisites and Admission
  - 1.3 Quiz
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# Classes

- **Language.** This lecture will probably be held in English.
- **Time.** Throughout the term: **Fridays, 11:15 – 13:00.**
- **Place.**
  - All classes will be online via Zoom  
see TISS and/or TUWEL for the Zoom link
  - Also the quiz at the beginning of the semester will be via Zoom

# Prerequisites and Admission

- **Prerequisites.**
  - This course is designed for **master's students**.
  - It is highly recommended to attend this course **after** the course **Formale Methoden der Informatik (185.291)**.
- **Knowledge and skills required.**
  - basic knowledge in mathematical logic
  - introduction to complexity theory
  - in particular, the central concept of **“problem reduction”**
- **Admission.**
  - primarily for **master's students!**
  - **positive assessment in a quiz is required**
  - each student has at most two attempts

# Quiz

## ■ Goal.

- ensure that students have the required knowledge and skills
- basic knowledge in mathematical logic and complexity theory;
- in particular, the central concept of “**problem reduction**”.

## ■ Organization.

- **closed book** (no material allowed)
- Being able to solve all questions of the exercise sheet of block 1 (complexity theory part) of the course “Formale Methoden der Informatik” clearly suffices for the quiz.
- max. 10 credits; passed with  $\geq 5$ .

## ■ Date and Time.

- Tuesday, 6 October, 09:00 - 11:00
- Tuesday, 13 October, 09:00 - 11:00
- 60 min actual working time

# Organization of the Quiz (continued)

- the quiz will be **remote**
- make sure that you are alone in a room
- join the Zoom meeting
- the camera and microphone have to be switched on during the test
- you will receive the questions as PDF file
- print the file
- enter the solutions on the printout
- at the end: scan your solutions (or take pictures of sufficiently high quality) and upload the scan to TUWEL (in case of problems, send the scan via email to [pichler@dbai.tuwien.ac.at](mailto:pichler@dbai.tuwien.ac.at)).

# Communication

- (during, after) classes
- Course Homepage:  
`http://www.dbai.tuwien.ac.at/staff/pichler/complexity`
- TISS: please check your mail address in TISS
- TUWEL (probably)

# Course Overview

## Further details on topics from “Formale Methoden”

- Turing Machines, Complexity Classes
- Logarithmic Space
- Boolean Logic, proof of the Cook-Levin Theorem
- More NP-Completeness

## Further topics

- The polynomial hierarchy
- The class PSPACE
- Applications (Database Theory, Abduction, ...)
- Fixed-Parameter Tractability

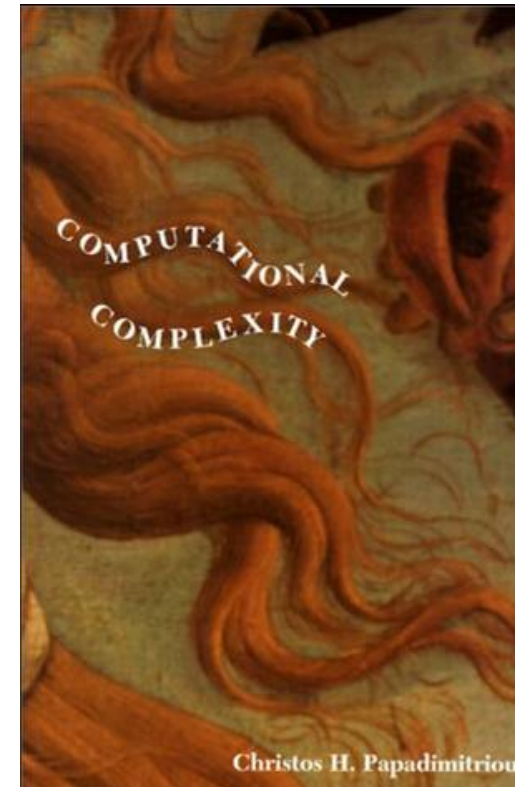


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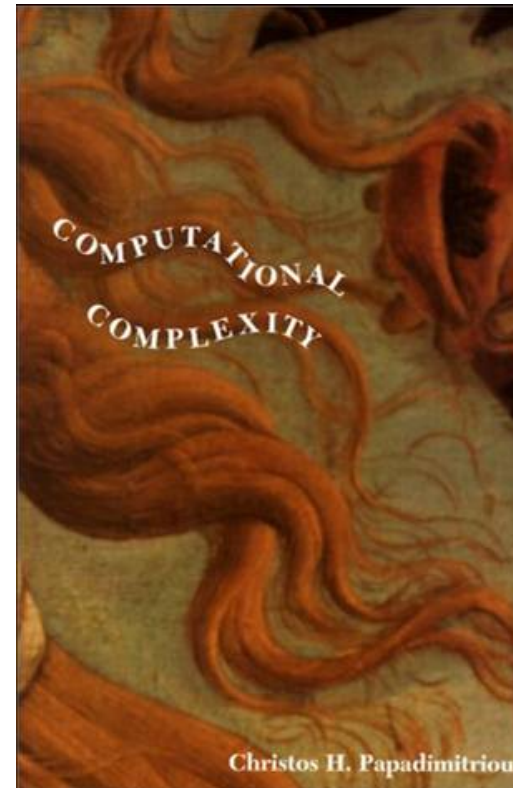
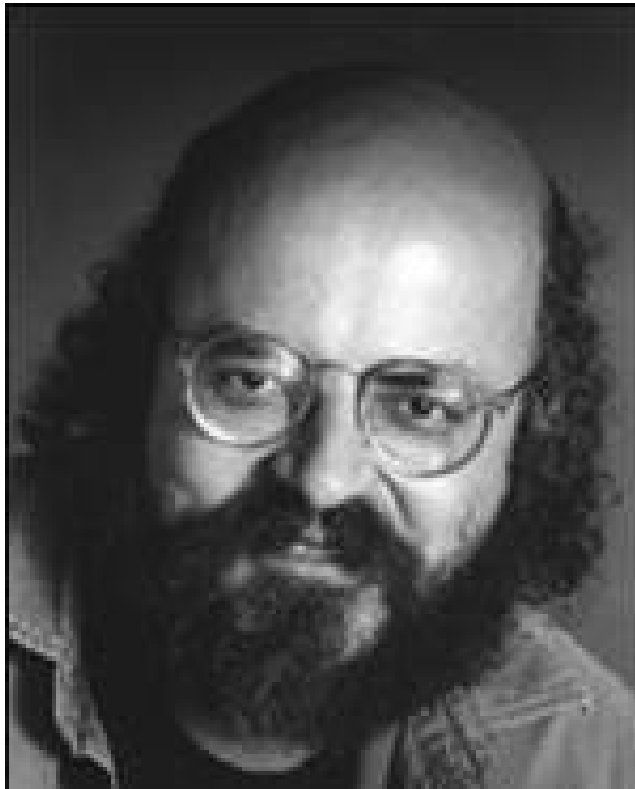
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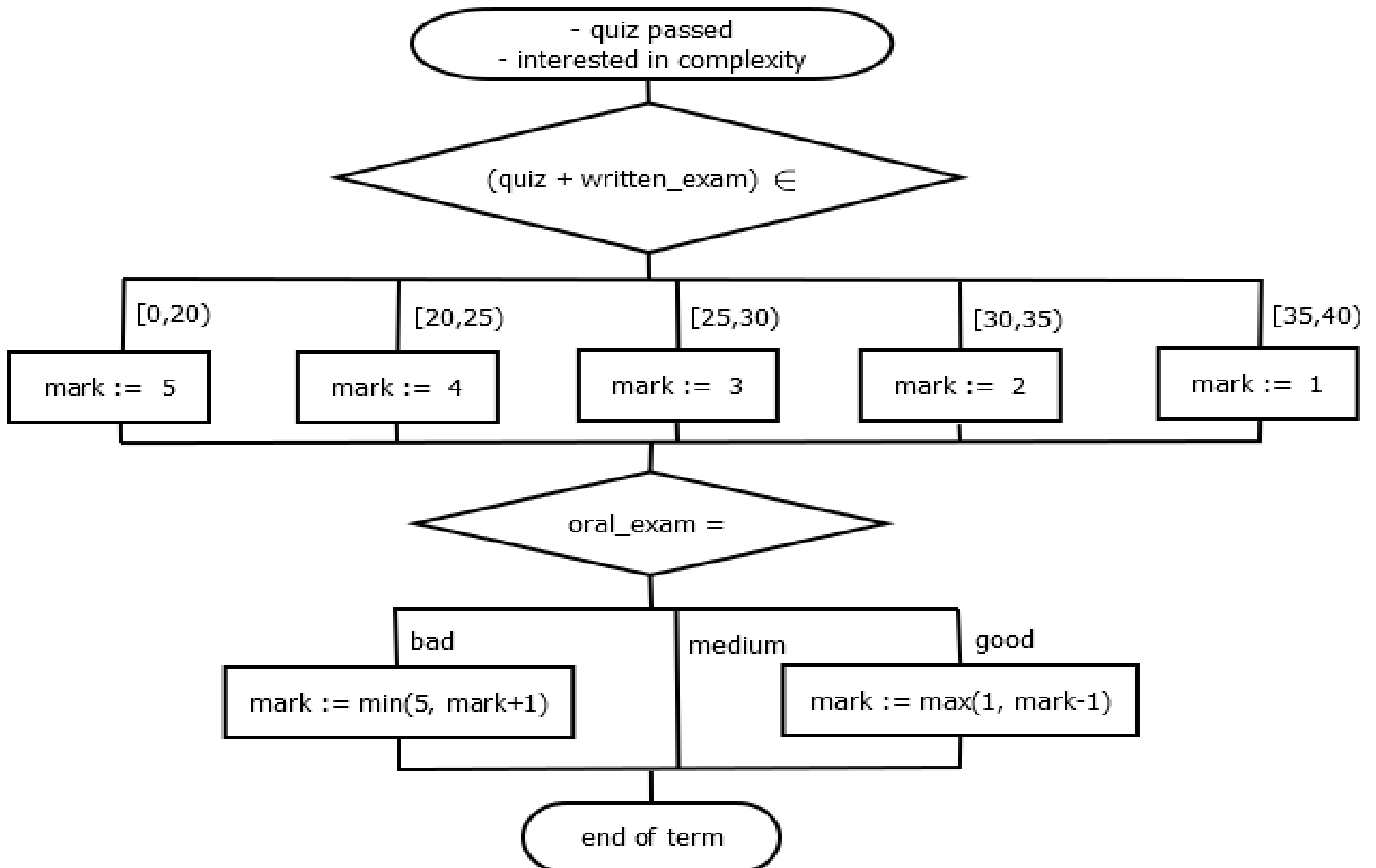
# Assessment

## Components

- Quiz: max. 10 credits
- Written Exam: max. 30 credits
- Oral Exam

## Final Mark

- Quiz + written exam: mark  $\in \{1, 2, 3, 4, 5\}$
- Mark after quiz + written exam (max. 40 credits):  
**1** [35, 40], **2** [30, 35), **3** [25, 30), **4** [20, 25)
- Oral exam: change mark by  $\{-1, 0, +1\}$
- Assessment of oral exam: good, medium, bad



# ECTS Breakdown

3 ECTS corresponds to 75h of work for “standard students” fulfilling the prerequisites (i.e., VU Formale Methoden der Informatik - 185.291).

quiz:	2h
12 classes (including preparation):	30h
exam preparation:	40h
exams:	3h
=====	
in total:	75h