Introduction to Technical Computer Science

Registration

You need to register for this lecture. The registration page will be activated at the beginning of the lecture in the Campus Office system providing you with access to the L²P platform and lecture material.

Content

The introduction to technical computer science is one of the mandatory lectures within the bachelor computer science studies. Goals are:

1. **Mediation of elementary knowledge concerning physical principles on which the functionality of electronical computers is based.** Furthermore, we will provide an insight into the most essential technologies and concepts that are required for the design and analysis of computer-based systems (e.g. for integrating computers into physical environments). In the lecture, we will presumably deal with the following aspects:
   - Basics to Physics I: electrical charge, electrical field, potential, voltage, current, Ohm's law, voltage divider, Kirchhoff's circuit laws
   - Basics to Physics II: capacitance, condenser, load curve, RC-low pass, inductance, RLC circuit
   - Semi-Conductor-Components I: P-n junction, diode, characteristic curve, applications: rectifier, AND/OR circuits
   - Semi-Conductor-Components II: bipolar transistor, characteristic curve, physical explanation (npn, pnp), applications: circuit, flip flop
   - Memory technologies: RAM, ROM, EPROM, EEPROM, FLASH
   - Programmable Logic: PAL, PLA, PLD, CPLD, FPGA
   - Hardware Design I: introduction to VHDL
   - Hardware Design II: synthesis of a simple control unit in VHDL
   - Analogous Circuits I: operational amplifier, basic circuits: comparator, Schmitt trigger
   - Analogous Circuits II: analog-to-digital and digital-to-analog conversion with operational amplifiers, pulse-width-modulated signals
   - Microcontrollers: architecture, programming, applications
2. **We will provide you with an overview of the basic functionality of modern computer systems and to be more precise of a computer's composition in principle regarded from the hardware point of view.** The basic components and the most important architectural principles of computers will be presented for this purpose. Particularly, we will discuss the following topics:
   - Boolean functions
   - Combinatorial circuits
   - Control units
   - Computer arithmetics
   - Computer architecture
   - Micro-programming

- Micro-processors
- Assembler programming

Literature

The lecture does not use any specific book, however, we recommend the following literature for deepening lecture content:

- R. Paul: Elektrotechnik und Elektronik für Informatiker.Bd.I, Teubner, Stuttgart 1994
- G. Bosse: Grundlagen der Elektrotechnik I. BI-Hochschultaschenbücker, Mannheim 1986
- Schiffmann Schmitz: Technische Informatik (Springer book)
    - Band I: Grundlagen der digitalen Elektronik (4. Aufl. 2001)
    - Band II: Grundlagen der Computertechni
- Rechneraufbau und Rechnerstrukturen von Walter Oberschelp, Gottfried Vossen
- Becker, Dechsler, Molitor: Technische Informatik. Pearson 2005

For further information, refer to the L²P platform.

Schedule

- **Regular lecture dates**
    - Mon 3:45pm - 5:15pm (Roter Hörsaal), starts 2008-10-20
    - Thu 10:00am - 11:30am (Aachener und Münchener Halle (Aula 1)), starts 2008-10-16
- **Regular exercise dates**
    - Fri 2:30pm - 4:00pm (Grüner Hörsaal), starts 2008-10-24
- On 2008-01-30 the exercise will end 15min earlier.
- **One-time exercise exam**
    - Date will be announced.
- Important: Only those dates that are published in the Campus system are applicable! Those dates are also viewable in the L²P where you can find lecture, exercise and exam dates.

Lecture

The lecture slides can be downloaded on the L²P platform soon.

Please register at the L²P platform. You need a login that can be applied for online via the TIM manager in the Rechenzentrum at any time. In order to be granted access to the L²P you must register at the Campus Office system and add the L²P platform.

Registration will be activated at the beginning of the lecture.

Note: The slides do not in any case replace a regular participation in the lecture itself. Please consider that the slides can lack of contents that are relevant for the exam.

Please refer to the Campus Office system for the lecture dates.

Contact

- Questions of general interest can be discussed in the L²P forum.
- Dr. rer. nat. Daniel Merschen