



Components, Basic Circuits & Simulation (MScTI_ANASIM)

Prof. Dr. P. Fischer

Lehrstuhl für Schaltungstechnik und Simulation
Technische Informatik der Uni Heidelberg



Organization

- Lecture & Exercise:
- Points: 6 Credit Points
- Time: **Friday**, 9:15 – 12:30 (with 15' break)
- Location: CIP Pool of new Physics Institute, INF 226
- Teacher: Prof. Dr. P. Fischer
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Visiting time: Thursdays, 11:00 (prenotation!)
- Secretary: Beate Wunsch
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- Internet: <http://sus.ziti.uni-heidelberg.de/Lehre>
- Examination: Written examination ('Klausur')
The exercises are important part of the exam!



Exercises

- Mainly in 2nd block (but also in 1st...)
- Homework can be done remotely
 - In all CIP Pools (KIP, PI, ...)
 - Remote via NX Client (will be explained...)
- All students need an account at the chair of circuit design
 - Will be distributed in one of next lectures
- For using the umc180 technology, a non-disclosure agreement has to be signed!



Content

■ Basics

- Voltage and current sources, Thévenin equivalent
- Bode plot, transfer function, low- and high pass

■ Devices

- Semiconductor properties
- Diode and transistor operation

■ Schematic Entry & Simulation:

- Symbols & Schematics, multiple instances, hierarchy
- Modeling of Diode und MOS, large / small signal models
- Analogue simulation (dc, ac, transient, sub-circuits)

■ Circuits:

- current mirror, gain stage, cascode, source follower, differential pair, switch
- Differential amplifiers (maybe folded cascode)



Further Comments

- The lecture is a mandatory element of major ,chip design‘
- Focus is on design of analogue circuits as a preparation of the VLSI Design lecture



Literature

- **Einführung in die Halbleiter Schaltungstechnik**
H. Göbel (Author of the 'Smile' Applets), Springer, ISBN 3-540-23445-4, ~50€
Easy to understand, nice level CD with Applets & PSPICE.
- **Analysis and Design of Analog Integrated Circuits**
P. R. Gray, P. J. Hurst, S. H. Lewis, R. G. Meyer, 4th edition, Wiley & Sons, New York, 1993. 129.25 €
Classic for analogue Design. Easy to read, but high level.
- **Principles of CMOS VLSI Design**
Neil H. E. Weste, K. Eshraghian, Addison-Wesley 1994, ISBN 0-201-53376-6, 91 € (Amazon)
Classic for CMOS Design, easy to read, not really up to date but sufficient for beginners.