### Department
-- please choose from drop down list --

### Course title
Design of integrated circuits

### Hours per week (SWS)
4

### Number of ECTS credits
6

### Course objective
- Technology of highly integrated circuits.
- Analog and digital circuit design.
- Building up a chip hierarchy.
- Organizing and executing a development project.
- Some specifics of modern deep submicron semiconductor technologies.

### Prerequisites
basics knowledge of semiconductor physics would be advantageous

### Recommended reading

### Teaching methods
Lectures and hands on training

### Assessment methods
100% written examination: 90'

### Language of instruction
English

### Name of lecturer
Helmut Fischer, Ullrich Menczigar

### Email
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### Link
http://www.fb06.fh-muenchen.de/fb/index.php/de/vita.html?staffid=767

### Course content
- Project planning and organization.
- Full custom versus semicustom design.
- The MOSFET (a refresher), the FINFET.
- Leakage mechanisms and low power design.
- Basics of full custom digital design.
- Design for manufacturing: 6 Sigma design and verification strategies.
- Mask generation: Lithography and OPC (Optical Proximity Correction).
- Device reliability and integrated circuits durability.
- Special analog and digital functional blocks.
- Single stage amplifier (common source circuit, source follower)
- Differential amplifier (with passive resp. with active load)
- Frequency behavior of amplifiers (single stage amplifier and differential amplifier)
- Single stage and dual stage operational amplifiers
- Hands on training:
  - Design and layout of a dual stage operational amplifier (Miller-OTA)
- Matching constraints in design and layout of operational amplifiers
- Layout rules
- Extraction of layout parasitics
- Simulation including layout parasitics

### Remarks
This course is on master level, yet open to everybody