

**Modulbeschreibung**

# Fabrication and Test of (Micro-) Electronic Circuits

**Allgemeine Informationen**

**Modulbezeichnung**

**Fabrication and Test of (Micro-) Electronic Circuits**

**Modulkategorie**

Fachliche Vertiefung

**Modulverantwortlicher**

Paul Zbinden, Tobias Lamprecht

**Anzahl der Credits**

3

**Durchführungssetting**

<b>Campus</b>	<input checked="" type="checkbox"/> Buchs (Fabrication)	<input checked="" type="checkbox"/> Rapperswil-Jona (Test)	<input type="checkbox"/> St. Gallen
<b>Online Teilnahme</b>	<input checked="" type="checkbox"/> keine Onlineteilnahme möglich	<input type="checkbox"/> hybrid	<input type="checkbox"/> ausschliesslich online
<b>Durchführung</b>	<input type="checkbox"/> wöchentlich	<input checked="" type="checkbox"/> als Blockwoche	<input type="checkbox"/> nach Absprache

**Ziele, Inhalt und Methoden**

**Lernziele, zu erwerbende Kompetenzen**

In this seminar you will gain an insight into how integrated circuits are manufactured, how electronic modules are created from individual components and which methods are mainly used to test circuits and systems. The entire course takes place as a block course and includes both theory and lab, where you will study the practical realization, characterization and testing of an electronic system. You will manufacture a simple integrated circuit yourself in a microfabrication center under clean room conditions, then assemble the elements into a module and validate all components with the test programs you have previously designed.

**Modulinhalt**

Theorie:

- Test process and test equipment
- Fault modelling
- Logic and fault simulation
- Test methods, such as IDDq, scan, BIST, analog test
- Basics on MEMS (micro-electro mechanical systems) and semiconductor fabrication processes: photolithography, ion-implantation, thin-film coating, etching
- Various analysis techniques for MEMS and semiconductors: Scanning electron microscope, optical microscope
- Packaging of electronic devices

Project: Design, fabrication, and test of a mixed analog / digital circuit (Test in Rapperswil, Fabrication Buchs)

- A simple gas flow sensor is manufactured in the microtechnology fabrication center (clean room) and assembled with other electronic components to form a system. This, during a two-day hands-on experience in microtechnology fabrication at the Campus Buchs (including thin film coating, lithography, and etching).
- The overall system and its subcomponents are designed in advance and prepared for testability. After manufacturing, the system is tested with your test program according to the methods developed in theory.
- You will be using modern design tools and test equipment.

**Lehr- und Lernmethoden**

- Seminar / Workshop
- Seminar will take place as a block module in the two weeks before the fall semester (KW36 / 37) with subsequent examination (ca. KW39). Seminar will be credited in fall semester.
- Limited number of attendees to assure the hands-on experience for each student

**Voraussetzungen, Vorkenntnisse, Eingangskompetenzen**

Bachelor in Elektrotechnik, Systemtechnik, Photonik, or similar

**Bibliografie**

- Michael Bushnell and Vishwani Agrawal, Essentials of Electronic Testing for Digital Memory and Mixed-Signal VLSI Circuits, ISBN: 978-0-306-47040-0, Springer Science+Business Media New York, 2006
- Ben Streetman and Sanjay Banerjee, Solid State Electronic Devices, 7th Ed., ISBN: 978-0-133-49680-2, Prentice Hall Upper Saddle River, 2015.

### Leistungsbewertung

#### Prüfungsart

Written exam (Moodle exam), on-site, 60 min.

#### Zulassungsbedingungen

- Attendance and active participation in the courses offered.
- Project carried out until the module test.

#### Hilfsmittel

Open Book