3.1 Sensors B

Sensors B

Module summary
Module code: STM310
Module coordinator: Prof. Dr. Harald Sehr
Credits (ECTS): 6
Semester: Summer Semester
Pre-requisites with regard to content: STM210 Sensors A
Pre-requisites according to the examination regulations: --
Competencies: Students understand the different working principles of sensors and are able to choose a suitable sensor for a given application. They can design electronic circuits for signal conditioning and evaluate transfer functions and sensor characteristics of magnetic field sensors and inductive sensors. They comprehend the fundamentals, implementation and application of electrochemical and biosensors. Students understand fabrication technologies for optofluidic sensor systems. They are able to assess the potential for miniaturization of advanced and complex analysis systems and can design the microtechnological process route required for the fabrication of lab-on-a-chip devices.
Assessment: Written Examination of 180 min duration

Course: STM311 Physical Sensors B
Module code: STM311
Lecturer: Prof. Dr. Harald Sehr
Contact hours: 2 SWS
Semester of delivery: Summer Semester
Type/mode: Type: Lecture / Mode: Mandatory
Language of instruction: English
Content: Working principles, applications and signal conditioning of physical sensors are discussed. The topics in detail are: Thermocouples, magnetic field sensors, induction sensors, inductance sensors, eddy current sensors, magnetisation sensors.
Recommended reading: Fraden, Handbook of Modern Sensors, AIP Press, Springer Doebelin, Measurement Systems, McGraw-Hill
Comments: Lecture notes are available on ILIAS.

Course: Optofluidic Sensor Systems
Module code: STM312
Lecturer: Prof. Dr.-Ing. Christian Karnutsch
Contact hours: 2 SWS
Semester of delivery: Summer Semester
Type/mode: Type: Lecture / Mode: Mandatory
Language of instruction: English
Content: Micro- and nanofabrication technologies for optofluidic sensors and instruments for micro- and nanomeasurements are discussed. Subsequently, applications of Optofluidics (some of them under active research) in the fields of biology, medicine and chemical detection systems are introduced by studying selected analysis systems and their miniaturization.
Recommended reading:

[1] Fabrication Engineering at the Micro- and Nanoscale; Stephen A. Campbell; Oxford University Press [2] MEMS and Microsystems: Design, Manufacture, and Nanoscale Engineering; Tai-Ran Hsu; John Wiley & Sons [3] Optofluidics: Fundamentals, Devices, and Applications; Yeshaiahu Fainman, Luke Lee, Demetri Psaltis, Changhuei Yang; McGraw Hill Professional [4] Scanning Electron Microscopy and X-Ray Microanalysis; Joseph Goldstein, Dale Newbury, David Joy, Charles Lyman, Patrick Echlin, Eric Lifshin, Linda Sawyer, and Joseph Michael; Springer
Comments: Lecture notes and all other course materials are available on ILIAS.

Course: Chemical and Bio Sensors
Module code: STM313
Lecturer: Prof. Dr. Markus Graf
Contact hours: 2 SWS
Semester of delivery: Summer Semester
Type/mode: Type: Lecture / Mode: Mandatory
Language of instruction: English
Content: The chemosensor portfolio is further extended by the electrochemical transduction principle including potentiometric, amperometric and conductometric sensor types. Subsequently, the particularities of biosensors and their implementation according to transduction principles are devised and respective applications are presented. Current trends such as miniaturization by micro- and nanotechnology and sensor system aspects are discussed.
Recommended reading: J. Janata, Principles of Chemical Sensors, Springer P. Gründler, Chemical Sensors, Springer F.-G. Banica, Chemical Sensors and Biosensors, Wiley Fundamentals: Brown et. al., Chemistry – The Central Science, Pearson, (SI units) J. Berg et al., “Biochemistry”, Freeman
Comments: Corresponding lecture notes and complementary materials are available on ILIAS