Department	06 Applied Sciences and Mechatronics
Course title	**Micro-sensors & Energy Haversting, (ECTS-Modul-No. PBR655)**
Hours per week (SWS)	4
Number of ECTS credits	5

Course objective

Students will be able to independently analyze complex issues in the field of microsensors and energy harvesting and derive possible solutions. They can critically evaluate microsensors and systems for energy conversion based on their data sheets and measurement data. Students will be able to reflect on their own skills with regard to theory and device analysis.

Contents:

Fundamentals of microsensor technology
Characteristic curves
Measurement uncertainty
Noise mechanisms

Microsensors
contacting temperature sensors (thermoresistance effect in metals, semiconductors and ceramics, Seebeck effect, band-gap temperature sensors)
force, pressure and strain sensors (strain gauges, piezoresistive and piezoelectric sensors)
Application: sensors in medical technology, building services engineering and process monitoring

Microactuators
Basics of actuator technology (operating principles, concepts, physics)
electrostatic actuators
piezo actuators (physics, applications, manufacturing processes)
application: positioners in microscopy, micropumps in medical technology

energy harvesting
principles of energy harvesting from the environment
Design and function of miniaturized energy-autonomous systems
Application: Operation of sensors under harsh environmental conditions, research area of "wearable electronics".

Processing, summary and presentation of current publications

Prerequisites

1. and 2. semester (Solid state physics recommended)

Recommended reading

Teaching methods

Seminaristic classes + Exercises
150 h, of which:
30 h seminar teaching
15 h exercise
15 h seminar
90 h self-study (preparation and post-processing, exam preparation).

Assessment methods

100% Written: 90' Option of improvement through exercise.

Language of instruction

English

Name of lecturer

Prof. Ney Moreira

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Link

Course content

Remarks