Courses in English
Course Description

Department	05 Technical Systems, Processes and Communication
Course title	**Automation Fundamentals**
Course number	
Hours per week (SWS)	4
Number of ECTS credits	5
Course objective	The student □ knows and understands the basic terminology of measurement and control techniques and the fundamental measurement and control elements and concepts, especially □ the mode of operation, the application and the use of different sensors □ the mode of operation, the application and the use of control elements for linear and non-linear dynamic systems □ the structure and the application of programmable storage control and comprehensive hierarchically constructed and decentralized automation system, including their application in process engineering systems □ can understand complex problems arising in the field of automation technology and work out concepts or solutions for the corresponding process; □ knows the important physical mechanisms in the paper and board production process, the construction and use of sensors and actuators for online measurement, as well as to control the machine-direction profile and the cross-direction profile of those parameters which govern quality; □ knows and understands the construction and method of operation of automation systems, especially the quality and process control systems.
Prerequisites	Basic knowledge of mathematics, physics and chemistry
Recommended reading	Schaum's Outline of Feedback and Control Systems, Second Edition, Joseph J. DiStefano, Joseph DiStefano, Allen Stubberud, Ivan Williams, McGraw-Hill Com-panies,Incorporated, 1995, ISBN 0070170525, 9780070170520
Teaching methods	Seminar-type teaching
Assessment methods	Written exam
Language of instruction	English
Name of lecturer	Dr. Tobias Kleemann
Email	tak@ivp.org
Link	https://moodle.hm.edu/enrol/index.php?id=17162
Course content	□ Sensors and correcting control elements, measurements and control elements □ Modern scanning and non-scanning measurement procedures and systems □ Fixed and mobile measurement systems □ Modern virtual or soft sensor systems, proxy sensing and sensor fusion □ Mesh sensor clusters and wireless mesh networks □ Smart sensors and in-situ data pre-processing □ Energy harvesting for low-energy sensors □ Industry Internet-of-Things (IIoT) and current applications in the industry □ Machine direction profile and cross-direction profile control □ Web inspection systems □ Systems for monitoring machine condition and diagnosis, predictive maintenance □ Systems for recognition of breaks in the web and other malfunctions (Event Capturing) □ Machine control system layouts and digital user interfaces for operators □ Batch and continual processes □ Programmable logic control (PLC) □ Quality control and process control systems
Remarks	