

<b>Course of study/ focus of study:</b> M.Sc. Produktionstechnik und -management M.Sc. Nachhaltige Energiesysteme im Maschinenbau M.Sc. Berechnung und Simulation im Maschinenbau M.Sc. Konstruktionstechnik und Produktentwicklung im Maschinenbau	
<b>Module name / title</b>	<b>Control Systems and Sensor Systems (engl.)</b>
<b>Module number</b>	CSSS
<b>Module coordinator/ person responsible</b>	Herr Prof. Dr. Marcus Wolff
<b>Duration of the module/ semester/ frequency</b>	1 Semester/ 1st or 2nd semester/ Each year
<b>Credits (CP)/ semester hours per week (SHW)</b>	5 LP/ 3.00 SWS
<b>Type of module , Applicability of the module</b>	Compulsory optional module
<b>Workload</b>	Contact hours: 54 h and Self-study: 96 h (Basis: 18 semester weeks (incl. exam time), 1 SHW = 60 minutes)
<b>Module prerequisites Requirements for participation/ previous knowledge</b>	
<b>Teaching language</b>	Teaching language: English Alternate teaching language: German If there is more than one teaching language, the used teaching language will be announced by the lecturer.
<b>Competencies gained/ Learning Outcome</b>	Competencies to be acquired with regard to professional and methodological skills: <ul style="list-style-type: none"> <li>- The students understand the relevant working principles and methods of sensor technology.</li> <li>- The students are capable to evaluate, select and apply sensor systems and methods in the mechanical and production engineering practice.</li> <li>- The students know the technical terms, facts and concepts of sensor technology and are able to acquire understanding of new concepts and methods in the field of sensor technology.</li> </ul> Competencies to be acquired with regard to social and personal skills: <ul style="list-style-type: none"> <li>- Team working skills</li> <li>- Communication skills</li> <li>- Time management</li> <li>- English language</li> <li>- Learn and working techniques</li> </ul>
<b>Content of the module</b>	A selection of the following sensor systems will be covered: <ul style="list-style-type: none"> <li>- Sensors for static mechanical quantities: Position, distance, displacement, thickness, level, expansion, etc.</li> <li>- Sensors for dynamic mechanical quantities: Velocity, acceleration, flow, frequency, amplitude, etc.</li> <li>- Sensors for other mechanical quantities: Force, torque, pressure, tension, sound, density, viscosity, etc.</li> <li>- Sensors for concentration and analytics: physical, spectrometric, chemical, electro-chemical, etc.</li> <li>- Sensors for optical quantities: Intensity, wavelength, etc.</li> <li>- Sensors for temperature</li> </ul>

<b>Requirements for the award of credit points (Study and exam requirements)</b>	<p>Regular examination type for module testing: Written exam: 60-90 minutes (PL)</p> <p>Further possible examination types: oral exam 30-45 minutes, presentation 45-60 minutes, written report/paper: 15-20 standard pages</p> <p>Where more than one possible examination type is used in the module, the examination type to be used is to be made known by the responsible lecturer at the start of the course.</p>
<b>Learning and teaching types/ methods/ media types</b>	<ul style="list-style-type: none"> <li>- Lecture</li> <li>- Presentation</li> <li>- Experiments</li> <li>- Individual and group work</li> <li>- Self-study</li> </ul>
<b>Literature</b>	<p>Marcus Wolff, Sensor-Technologien, Band 1: Position, Entfernung, Verschiebung, Schichtdicke, De Gruyter Oldenbourg, Berlin, ISBN: 978-3-11-046095-7 (2016)</p> <p>Marcus Wolff, Sensor-Technologien, Band 2: Geschwindigkeit, Durchfluss, Strömungsfeld, De Gruyter Oldenbourg (Reihe De Gruyter Studium) Berlin, ISBN: 978-3-11-047782-5 (2017)</p> <p>Jacob Fraden, Handbook of Modern Sensors. Physics, Designs, and Applications, Springer- Verlag, New York, ISBN:978-3319193021 (2015)</p>