

Department	06 Applied Sciences and Mechatronics
Course title	Biomicro- and bionanotechnology
Hours per week (SWS)	4
Number of ECTS credits	6
Course objective	<ul style="list-style-type: none"> <input type="checkbox"/> Deepened understanding of fundamental principles of micro- and nanoscale systems in molecular and cell-biology <input type="checkbox"/> Comprehensive understanding of self-organization mechanisms, molecular recognition, biophysical and biotechnological methods as well as knowledge of extent of validity <input type="checkbox"/> Ability to create or deliberately modify micro- and nanoscale systems by biophysical and biotechnological processes and to influence their physico-chemical properties <input type="checkbox"/> Ability to gather information and evaluate it critically
Prerequisites	recommended: Basics in physics, chemistry, and physical chemistry
Recommended reading	<p>M. Wevers u. D. Wechsler: Nanobiotechnologie I: Grundlagen und technische Anwendungen molekularer, funktionaler Biosysteme, Zukünftige Technologien, Band 38, VDI Technologiezentrum, Düsseldorf, 2002. Kostenlos unter: http://www.nanobio.de/publikationen.html</p> <p>C. M. Niemeyer and C. A. Mirkin (Eds.): Nanobiotechnologie, Wiley-VCH, Weinheim, 2004.</p> <p>Ph. Nelson, Biological Physics – Energy Information, Life, Freeman, New York, 2004.</p> <p>J. Israelachvili: Intermolecular and Surface Forces, 2nd ed., Academic Press, San Diego, 1991.</p> <p>J. Howard, Mechanics of Motor Proteins and the Cytoskeleton, Sinauer Associates, Inc., Sunderland MA, 2001.</p> <p>H.-G. Rubahn, Nanophysik und Nanotechnologie, Teubner, Stuttgart, 2002.</p> <p>H. E. Gaub, et al., Von Zwergen und Quanten – Struktur und Technik des Kleinsten, Wissenschaft für Jedermann, Bd. 2, Kosmos Verlag Stuttgart, 2002.</p> <p>Rogers et al., Nanotechnology – Understanding Small Systems, CRC Press, London, 2008.</p> <p>B. Alberts, et al., Molecular Biology of the Cell, 4th ed. Garland Science, New York, NY, 2002. (Deutsche Ausgabe bei Wiley-VCH, Weinheim).</p> <p>J. Berg, J. Tymoczko, L. Stryer, Biochemistry, 5th ed, Freeman, New York, NY, 2002. (Deutsche Ausgabe, Spektrum Akademischer Verlag.)</p> <p>J. Koolman, K-H. Röhm, Taschenatlas der Biochemie, 3. Aufl., Thieme, Stuttgart, 2003. Ausgewählte Originalliteratur.</p>
Teaching methods	seminaristic teaching with exercises
Assessment methods	90min written exam
Language of instruction	English
Name of lecturer	Prof. Hauke Clausen-Schaumann
Email	hauke.clausen-schaumann@hm.edu
Link	
Course content	<ul style="list-style-type: none"> <input type="checkbox"/> Introduction to the basics in molecular biology and bio-chemistry <input type="checkbox"/> Thermodynamics related to biological systems <input type="checkbox"/> Intra- and intermolecular interactions <input type="checkbox"/> Selforganization and structure forming / membranes <input type="checkbox"/> Cell mechanics, setup and dynamics of the cytoskeleton <input type="checkbox"/> Setup of nanoscale structures by selforganization and molecular recognition <input type="checkbox"/> Application of biotechnological processes in micro- and nanotechnology, e.g. DNA nanotechnology, biochips
Remarks	