

**SCIENTIFIC AND METHOD MODULES**

<b>Module name</b>	<b>Hybrid systems</b>
<b>Number</b>	2011-M09
<b>Aims</b>	Understanding the principles in preparation and application of hybrid systems, including immobilization of biomolecules and prerequisites for materials to attach biomolecules, as well as possible future application in biomedicine, biotechnology, and informatics.
<b>Basics</b>	(For topics marked with an asterisk an e-learning module shall be utilized, the others are covered by lectures from existing master courses): Chemical synthesis of peptides and carbohydrates, recombinant expression of proteins, protein folding, protein analysis, introduction into surface materials, principles of analysis of surfaces, basics in polymers/macromolecular science*
<b>Contents</b>	1. Protein expression by specific methods that allow modification and introduction of non proteinogenic amino acids, intein and impact system, modification of tRNA and genetic code expansion, selective chemical modification of proteins, pegylation of proteins, biocompatibility of materials, problems of toxicity and biodegradation. 2. Material aspects, including generation of polymers, surface modification, nanoscaffolds, preparation of building blocks, chemical modification of surfaces. 3. Preparation and analysis of hybrid compounds, ligation strategies, immobilization, application of hybrid materials in biomedical science, for biosensors, and for functional materials.
<b>Methods</b>	Techniques to obtain modified proteins, side chain protection strategies in peptide synthesis, cell-based assays to study toxicity, biostability and inflammation, analytics will include AFM and solid-state NMR.
<b>Type</b>	Two-day block course/ yearly recurrence with modification
<b>Date (month/year)</b>	November 10-11, 2011
<b>Time</b>	09:00 – 14:00
<b>Work load</b>	8 hours presence/ 45 hours self-study
<b>Examination</b>	written
<b>Credit points</b>	2
<b>Responsible scientists</b>	Robitzki, Käs

## SCHEDULE for Module 2011-M09

Time	Lecturer	Programme	Location
<b>November 10, 2011</b>			
09:00-09:30	<b>Prof. Dr. J. Käs</b>	Welcome	Aula, Linnéstr. 5
09:30-10:30	<b>Prof. Dr. J. Spatz</b> Max-Planck-Institut für Intelligente Systeme/ Professor Universität Heidelberg	Induction of cellular responses by molecularly defined nanopattern	Aula, Linnéstr. 5
10:30-11:00	<i>Coffee, Tea &amp; Refreshments</i>		
11:00-12:00	<b>Prof. Dr. H. Fuchs</b> Westfälische Wilhelms- Universität Münster & Center for Nano- technology (CeNTech) Münster	Functional nanomaterials and nanoscopy - novel concepts and application to biomimetic systems -	Aula, Linnéstr. 5
12:00-13:00	<i>Lunch break</i>		
13:00-14:00	<b>Prof. Dr. J. Käs</b>	The role of biological matter in hybrid approaches	Aula, Linnéstr. 5
<b>November 11, 2011</b>			
09:00-10:00	<b>Prof. Dr. J. Käs</b>	Approaches to form controlled neuronal networks	Aula, Linnéstr. 5
10:00-10:30	<i>Coffee, Tea &amp; Refreshments</i>		
10:30-11:30	<b>Prof. Dr. D. Belder</b> Universität Leipzig, Fakultät für Chemie und Mineralogie, Institut für Analytische Chemie	Towards a chemical lab on a chip device	Aula, Linnéstr. 5

### Didactic elements:

Lecture, discussions, practical training – lab demonstration, etc.

### Expected performance:

Active participation in discussions during lab demonstration etc.