

<b>Title of the module</b>	<b>Basics in biomolecular medicine</b>		
<b>Term/semester</b>	Winter term / 1		
<b>VAK-Number</b>	Will be assigned centrally		
<b>Credit points</b>	6 ECTS		
<b>Compulsory/ elective course</b>	Compulsory course		
<b>Teaching methods</b>	Method	SWS	CP
	Lecture	2 (28h)	3
	Exercises	2 (28h)	3
<b>Self study</b>	Self studies and learning for the exam 124 h		
<b>Module representative</b>	Prof. B. Reinhold-Hurek		
<b>Instructor</b>	Prof. B. Reinhold-Hurek Dr. K. Maedler Prof. R. Stick Prof. A. Dotzauer		
<b>Examiner</b>	Prof. B. Reinhold-Hurek Dr. K. Maedler Prof. R. Stick Prof. A. Dotzauer		
<b>Objectives</b>	<p>Dotzauer: Impartment of the principles of viral transmission, replication and virus-cell interactions to understand the molecular mechanisms resulting in viral diseases.</p> <p>Reinhold-Hurek: Increase knowledge on microbial diversity, principles of identification and interaction mechanisms</p> <p>Stick: Understanding the molecular basis of antibody diversity. Exemplifying the relationship between protein structure, cellular structure and inherited disease: lessons from cytokeratins and nuclear lamins.</p> <p>Maedler: To understand the molecular mechanisms of glucose homeostasis, cellular interactions, the pathophysiology of diabetes, cell proliferation, neogenesis and apoptosis.</p> <p>Summary: Impartment of the meaning and consequences of pathogenetic molecular mechanisms and of dysfunctions in biochemical processes and interactions with regard to the development of diseases.</p>		
<b>Content of teaching</b>	<p>Dotzauer: Biochemistry of viruses and infectious diseases</p> <ul style="list-style-type: none"> <li>- principles of and concepts in virology</li> <li>- transcriptional regulation</li> <li>- protein processing</li> <li>- protein structure</li> <li>- macromolecular assembly</li> <li>- cell cycle control</li> <li>- signal transduction</li> <li>- innate and adaptive immune responses</li> <li>- immune evasion</li> <li>- molecular mechanisms of virus effects in infection</li> <li>- pathogenesis of viral infections</li> <li>- anti-viral drugs / vaccines (prevention and control of diseases)</li> <li>- discussion of individual viruses, relevant for human diseases</li> <li>- development and use of viral expression vectors</li> </ul> <p>Reinhold-Hurek: Interactions between microorganisms and eukaryotes</p> <ul style="list-style-type: none"> <li>- Microbial Diversity</li> <li>- Methods of detection and identification of microorganisms</li> <li>- Examples for mechanisms of interaction between bacteria and eukaryotes,</li> <li>- Quorum sensing</li> </ul> <p>Stick: Antibody structure</p> <ul style="list-style-type: none"> <li>- Gene organisation of immunoglobulin genes in the germ line</li> <li>- Rearrangement of immunoglobulin genes during B-cell</li> </ul>		

	<p>differentiation; generation of antibody diversity</p> <ul style="list-style-type: none"> <li>- Structure - function relationship exemplified at inherited disease of particular cytoskeletal proteins (cytokeratins, nuclear lamins)</li> <li>- Intermediate filament (nanofilament) proteins: protein structure, filament formation, differential expression, and tissue integration,</li> <li>- Clinical picture of different types of epidermolytic disease.</li> <li>- Molecular biology of corresponding diseases.</li> <li>- Clinical picture of laminopathies and molecular biology of laminopathic mutations.</li> </ul> <p>Maedler: Metabolic dysfunctions and disease</p> <ul style="list-style-type: none"> <li>- Introduction: metabolic diseases and diabetes</li> <li>- pathophysiology of diabetes: autoimmune vs. metabolic diseases</li> <li>- hormones which regulate glucose homeostasis</li> <li>- insulin producing cells: metabolic demand, adaptation, turnover</li> <li>- sources of new cells: replication vs. neogenesis</li> <li>- cell death: necrosis / apoptosis / autophagy</li> <li>- sources of cytokine / chemokine production</li> <li>- treatment targets of diabetes: transplantation / stem cells / stimuli of proliferation/ improving insulin action and insulin secretion</li> </ul>
<p><b>Educational objectives</b></p>	<p>Dotzauer:</p> <ul style="list-style-type: none"> <li>• Ability to understand advanced contents of virology and immunology.</li> <li>• Ability to understand principles of pathobiochemical and pathogenetic processes and their meaning in development of diseases (pathogenetic principles).</li> </ul> <p>Reinhold-Hurek:</p> <ul style="list-style-type: none"> <li>• Ability to understand advanced contents of functional diversity of microorganisms and their interactions with hosts</li> </ul> <p>Stick:</p> <ul style="list-style-type: none"> <li>• Ability to understand principles of antibody structure and generation of antibody diversity</li> <li>• Ability to understand principles of the cytoarchitecture of epithelial cells and the nuclear architecture and basics of diseases related to these cytoskeletal elements</li> </ul> <p>Maedler:</p> <ul style="list-style-type: none"> <li>• Ability to understand advanced contents in metabolic diseases and principles of metabolic research in vivo and in vitro.</li> </ul> <p>Summary:</p> <ul style="list-style-type: none"> <li>• Ability to understand principles of molecular processes and mechanisms causing disease and of molecular characteristics of diseases.</li> </ul>
<p><b>Evaluation of learning progress</b></p>	<p>Discussion of actual topics.</p>
<p><b>Assessment</b></p>	<p>Written test (100%)</p>
<p><b>Frequency</b></p>	<p>winter term</p>
<p><b>Usage in other degree programmes</b></p>	<p>no</p>
<p><b>Requirements</b></p>	<p>Admission to the master course "Biochemistry and Molecular Biology"</p>