

<b>M4434</b>	<b>Applied Microbiology</b>			
<b>Coordinator (responsible lecturer)</b> Prof. Dr. U. Schurr ( <a href="mailto:u.schurr@fz-juelich.de">u.schurr@fz-juelich.de</a> )				
<b>Lecturers</b> Prof. Dr. U. Schurr ( <a href="mailto:u.schurr@fz-juelich.de">u.schurr@fz-juelich.de</a> ) and PD Dr. U. Rascher ( <a href="mailto:u.rascher@fz-juelich.de">u.rascher@fz-juelich.de</a> ), Dr. S. Matsubara ( <a href="mailto:s.matsubara@fz-juelich.de">s.matsubara@fz-juelich.de</a> ), Dr. A. Wiese-Klinkenberg ( <a href="mailto:a.wiese@fz-juelich.de">a.wiese@fz-juelich.de</a> )				
<b>Contact and organization</b> Dr. S. Matsubara ( <a href="mailto:s.matsubara@fz-juelich.de">s.matsubara@fz-juelich.de</a> )				
<b>Workload</b> 420 h	<b>Credit points</b> 14 CP	<b>Contact time</b> 300 h	<b>Self-study</b> 120 h	<b>Duration</b> 1 semester
<b>Course components</b> Practicals: 18 PPW Lectures: 2 PPW		<b>Frequency</b> Winter term		<b>Group size</b> 12 students
<b>Learning outcomes/skills</b> <ol style="list-style-type: none"> <li>1. Students are able to list and describe the principles of living systems as well as underlying concepts of various regulatory systems, expression systems and whole cell systems. They have acquired an understanding of how basic science is translated to biotechnological applications.</li> <li>2. Students are in a position to independently solve problems and assignments from the field.</li> <li>3. Students have learned to independently and accurately handle equipment and instruments used in a microbiology laboratory. Current techniques in molecular biology can be described.</li> <li>4. At the end of the course students are able to independently plan and execute basic experiments in molecular biology. They are able to explain and evaluate results as well as to transfer these results to related problems.</li> </ol>				
<b>Forms of teaching</b> Lecture, practical course, protocol writing, preparing a presentation				
<b>Contents</b> General topics in microbiology, molecular biology and biotechnology Cultivation of microorganisms (bacteria, yeasts, fungi) to varying scales, fungal model systems and their biology, application of molecular biological and biochemical research methods to the analysis of biomolecules, e.g. determination of parameters relevant to production, plasmid construction, fusion of reporter genes, PCR techniques, global methods of analysis such as transcriptomics or proteomics, protein expression/purification in homologous and heterologous host models, immune detection (Western blot), protein secretion, whole cell biocatalysis, biotransformation, construction of mutants (strain optimisation), use of molecular biological methods for protein engineering and directional evolution (random and site directed mutagenesis), enzyme characterisation by protein biochemical methods, use of various enzymes in biotechnology, production of amino acids and other microbial products, strain optimisation, regulation of microbial (eukaryotic and prokaryotic) expression and production processes, posttranscriptional regulation.				
<b>Requirements for admission</b> <b>Formal:</b> Bachelor of Science (Biology, Biochemistry, comparable), admission to Master course <b>With regards to content:</b> Knowledge of microbiological and molecular biological				

techniques, basics in microbiology and biochemistry are preferable
<b>Type of examination</b> Written exam to test knowledge (cf. 1-3): 70% and marked protocol (cf. 3-4): 30%
<b>Requisites for the allocation of credit</b> Regular attendance of the practical course, handing in a scientifically acceptable protocol, results and literature seminar (additional 2 CP) and a passed written exam.
<b>Relevant for following study programmes/major (only MSc programme)</b> M.Sc. Biology M.Sc. Biology International;
<b>Affiliation with the following Major (only for master study programme)</b> Microbiology/ Biotechnology
<b>Compatibility with other curricula</b> None
<b>Significance of the mark for the overall grade</b> The mark given will contribute to the final grade in proper relation to its credits. M.Sc. Biology International: 14/44 CP
<b>Course language</b> English
<b>Additional information</b> Enrolling into the module is granted by the central study office of the Department of Biology. The first four weeks of the module take place prior to the summer term in March at the IMET (Prof. Jäger) and IBG1 (Prof. Bott) at Forschungszentrum Jülich. The final two weeks take place at the Institute for Microbiology at HHU Düsseldorf.