

<b>Module Name</b> Molecular Plant Physiology and Biochemistry of Plants and Associated Microbes						
<b>Type of Module</b> ○ Advanced Module				<b>Module Code</b> Molecular Plant Physiology		
<b>Identification Number</b> MN-B-SM (P 3)	<b>Workload</b> 360 h	<b>Credit Points</b> 12 CP	<b>Term</b> 2 <sup>nd</sup> term of studying	<b>Offered Every</b> Summer term	<b>Start</b> summer term only	<b>Duration</b> 7 weeks
<b>1</b>	<b>Course Types</b> a) Lectures b) Practical/Lab c) Seminar		<b>Contact Time</b> 20 h 161 h 3 h	<b>Private Study</b> 30 h 117 h 24 h	<b>Planned Group Size</b> max. 5 max. 2 max. 5	
<b>2</b>	<b>Module Objectives and Skills to be Acquired</b> Students who successfully completed this module <ul style="list-style-type: none"> <li>• have acquired detailed knowledge about methods used in plant DNA technology and protein biochemistry as well as knowledge of principles and methods used in molecular plant physiology.</li> <li>• are trained in the use of transgenic approaches and methods to functionally analyze gene products and their impact on plant growth, development, and biotic interactions (see contents of the module).</li> <li>• can independently carry out small scientific projects related to the topic of the module.</li> <li>• have learned how to present research results in oral and written form and to critically discuss scientific publications related to the topic of the module on a professional level.</li> <li>• are able to transfer skills acquired in this module to other fields of biology.</li> </ul>					

<p><b>3</b></p>	<p><b>Module Content</b></p> <ul style="list-style-type: none"> <li>• Identification and screening of T-DNA insertion lines (primer design, PCR, gDNA)</li> <li>• Generation of transgenic plants and fungi</li> <li>• Pathogenicity assays</li> <li>• Generation of RNAi or artificial micro-RNA constructs</li> <li>• Detection of reporter gene activity</li> <li>• Localization studies of transgenic products</li> <li>• Comparative characterization of mutant lines</li> <li>• Metabolite profiling</li> <li>• DNA-protein interaction studies</li> <li>• Protein-protein interaction studies (co-immunoprecipitation, yeast two hybrid, split YFP)</li> <li>• Nutrient transport studies</li> <li>• Production of recombinant protein in <i>E. coli</i></li> </ul> <p><i>Explanatory note:</i> The list above comprises state-of-the art biochemical and molecular methods with emphasis on DNA technologies and protein biochemistry that are commonly used in the field of molecular plant physiology. Every student participating in this module will be confronted with a large subset of it. The exact content, however, will depend on the 4.5-week research project the student will work on (lab of Prof. Dr. M. Bucher: molecular physiology of plant-microbe interactions, lab of Prof. Dr. G. Döhlemann: plant immunity and microbial virulence, lab of Prof. Dr. U. Höcker: light signaling and developmental biology, lab of Prof. Dr. S. Kopriva: plant mineral nutrition, lab of Prof. Dr. B. Thomma: fungal pathogenicity, manipulation of host immunity and microbiome manipulation).</p>
<p><b>4</b></p>	<p><b>Teaching Methods</b></p> <p>Interactive tutorials; Practical/Lab (Project work); Seminar; Guidance to independent research; Training on presentation techniques in oral and written form</p>
<p><b>5</b></p>	<p><b>Prerequisites (for the Module)</b></p> <p>Enrollment in the Master's degree course "Biological Sciences"</p> <p><b>Additional academic requirements</b></p> <p>Previous attendance of the lecture module "Molecular Plant and Microbial Sciences (P)". Successful participation in an advanced Molecular Plant Physiology and Biochemistry module during the Bachelor's degree course (e.g. MN-B-WP II [mPlant 3] for Cologne students) or similar skills (after consultation). In cases of doubt, please contact the module coordinator (see 10) before choosing this subject module.</p>
<p><b>6</b></p>	<p><b>Type of Examination</b></p> <p>The final examination consists of two parts: oral presentation (20-30 min; 50 % of the total module mark), written report (50 % of the total module mark)</p>
<p><b>7</b></p>	<p><b>Credits Awarded</b></p> <p>Regular and active participation Each examination part at least "sufficient" (see appendix of the examination regulations for details)</p>
<p><b>8</b></p>	<p><b>Compatibility with other Curricula</b></p> <p>None</p>

9	<b>Proportion of Final Grade</b> 12 % of the overall grade (see also appendix of the examination regulations)
10	<b>Module Coordinator</b> Prof. Dr. Marcel Bucher, phone 470-2481, e-mail: m.bucher@uni-koeln.de
11	<b>Further Information</b> <b>Subject module</b> of the Master's degree course "Biological Sciences", <b>Specialization:</b> (P) Molecular Plant and Microbial Sciences <b>Participating faculty:</b> Prof. Dr. M. Bucher, Prof. Dr. G. Döhlemann, Prof. Dr. U. Höcker, Prof. Dr. S. Kopriva, Prof. Dr. B. Thomma <b>Literature:</b> <ul style="list-style-type: none"><li>Information about textbooks and other reading material will be given by the supervisors of the individual research projects.</li></ul> <b>General time schedule:</b> Week 1-4 (Mon.-Fri.) and Week 5 (Mon.-Wed): Tutorials and practical/lab; Week 5 (Thu-Fri) and Weeks 6 and 7 (Mon.-Fri): Preparation for the oral examination-(held in week 7)-as well as writing the seminar paper (= project report) <b>Note:</b> The module contains hand-on laboratory work conducted individually and is taught in research laboratories. The module does not contain computer-based practicals/research as a main component. <b>Introduction to the module:</b> May 22, 2023 at 9:00 a.m., Cologne Biocenter, room 4.003 (fourth floor) or online (in this case, further information/link will be sent to your Smail-Account). Additional Information on the currently most relevant topics of the module will be send to the participants via e-mail about one week before the practical work starts. <b>Oral examination:</b> July 12, 2023, second/supplementary examination August 25, 2023; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.