

M4443	Environmentally induced signaling processes in mammalian cells and <i>Caenorhabditis elegans</i>			
Coordinator (responsible lecturer/s) PD Dr. Joachim Altschmied (Joachim.Altshcmied@uni-duesseldorf.de), Univ. Prof. Dr. Judith Haendeler (juhae001@uni-duesseldorf.de)				
Lecturers PD Dr. Joachim Altschmied, Univ. Prof. Dr. Judith Haendeler, PD Dr. Klaus Unfried, Dr. Thomas Haarmann-Stemmann, Dr. Natascia Ventura, Dr. Niloofar Ale-Agha, Dr. Nadine Dyballa-Rukes, Dr. Anna Eckers, Dr. Tamara Hornstein, Dr. Sascha Jakob, Dr. Silvia Maglioni, Dr. Alfonso Schiavi				
Contact and organization Dr. Sascha Jakob (sascha.jakob@uni-duesseldorf.de)				
Workload 420 h	Credit Points 14 CP	Contact time 300 h	Self-study 120	Duration 1 Semester
Course components Practicals: 18 PPW Lecture: 2 PPW		Frequency every summer semester		Group size max. 4 students
Learning outcomes/skills The main topics of this module are signal transduction mechanisms as a response to environmental cues in mammalian cells and <i>C. elegans</i> as an animal model and selected experimental techniques to study these processes. The participants will acquire a sound theoretical and experimental, research-oriented knowledge in this field. Due to the restricted number of students, intensive supervision and hands-on experience for all students attending the course is guaranteed.				
Forms of teaching Lecture accompanying the practical course Practical course (groups of two)				
Content The cellular response to external signals plays a central role in many physiological and pathophysiological situations. In this course we will elaborate on basic mechanisms of signal transduction in eukaryotic cells and the nematode <i>C. elegans</i> as responses to environmental cues. An emphasis will be put on mitochondria, membrane and transcription changes as well as on adaptive reactions of a whole organism using "state-of-the-art" experimental techniques. <u>Lecture:</u> The practical course is accompanied by a daily lecture of approximately one hour. In this lecture the theoretical background (membrane-bound and cytosolic receptors, mitochondria, signaling cascades, transcription factors, cell proliferation, cell migration, apoptosis, <i>C. elegans</i>) will be discussed. On the other hand, experimental techniques will be presented, which are suitable for the molecular and cell biological, as well as biochemical analysis of these signaling processes in mammals and nematodes. <u>Practicals:</u> The practical work, which will be carried out in groups of two, will encompass a broad spectrum of modern experimental methods to analyze signal transduction processes and cellular reactions to external stimuli and stress adaptation in <i>C. elegans</i> . An emphasis will be on as much "hands-on-time" as possible to accustom the students with practical laboratory work; therefore,				

<p>a good preparation is indispensable, which will be monitored by pre- and post-attestations. In addition, the experimental work has to be documented in a written protocol, which has to be submitted shortly after the course.</p> <p>The course is divided into four different parts, which will be carried out by four different workgroups in the IUF: mitochondria and signal transduction (AG Haendeler), membrane dependent signaling (AG Unfried), aryl hydrocarbon receptor (AhR) signalling (AG Haarmann-Stemann) and stress responses in <i>C. elegans</i> (AG Ventura).</p>
<p>Eligibility</p> <p>Formal: Bachelor in biology or biochemistry or a closely related field with adequate biological content and acceptance for the Master's program Biology or Biology International of the HHU Düsseldorf</p> <p>Content: Profound basic knowledge of cell biology, gene regulation, signal transduction and biochemistry</p>
<p>Examination types</p> <p>(1) skill area knowledge (50% of grade): oral examination about the content of the lectures and the practical course</p> <p>(2) skill area documentation (25% of grade): written protocol with results and discussion of the experiments</p> <p>(3) skill area experimental design and performance (25% of grade): short daily oral pre- and post-attestations covering the theoretical background and practical aspects of the experiments</p>
<p>Requirements for the award of credit points for this module</p> <p>(1) Regular attendance at lectures and practical course (maximally two days of absence)</p> <p>(2) Protocol with results and discussion meeting criteria of a scientific documentation</p> <p>(3) Passed oral exam in the skill area knowledge</p>
<p>Relevant for following study programmes/major (only MSc programme)</p> <p>MSc Biology, MSc Biology International, MSc Molecular Medicine</p>
<p>Compatibility with other curricula</p> <p>MSc Biochemistry</p>
<p>Significance of the mark for the overall grade</p> <p>The grade obtained will contribute to the final grade in relation to its credit points</p>
<p>Course language</p> <p>English</p>
<p>Additional Information</p> <p>Central allocation of participation (PD Dr. Schumann)</p>