

Module Name Epigenetics (Schweiger)						
Identification Number		Workload	Credit Points	Term	Offered Every	Duration
MN-BC-BSM03		360 h	12 CP	1 <sup>st</sup> or 2 <sup>nd</sup> term	Winter, 1 <sup>st</sup> half	7 weeks
1	<b>Type of lessons</b> a) Lectures b) Practical/Lab c) Seminar		<b>Contact Times</b> 24 h 154 h 8 h	<b>Self-Study Times</b> 48 h 102 h 24 h	<b>Group Size*</b> max. 8 max. 1 max. 8	
2	<b>Module Objectives and Skills to be Acquired</b> Students who successfully completed this module... <ul style="list-style-type: none"><li>• have gained broad insight into the field of epigenetics and its implications in development, differentiation and disease</li><li>• are familiar with the mechanisms of epigenetic regulation and misregulation in human diseases</li><li>• have attended a laboratory with epigenetic projects and have had hands-on experience with technologies used for epigenetic research</li><li>• started to acquire bioinformatics skills for high-throughput sequencing data analyses</li></ul>					
3	<b>Module Content</b> <ul style="list-style-type: none"><li>• application of different technologies (sequencing, FISH, mass cytometry, biochemistry structural biology) in epigenetics research</li><li>• design and performance of experiments and data analyses related to epigenetics</li><li>• DNA methylation and demethylation: nucleic acid modifications, transcriptional regulation, mRNA-splicing, conservation of the mechanisms,</li><li>• epigenetic DNA methylation clocks and their predictive capacity in ageing and disease</li><li>• chromatin remodellers, chromatin modifying enzymes</li><li>• hetero- vs euchromatin, higher order chromatin structure and genome architecture</li><li>• Cell fate and cellular memory: differentiation, cell fate, polycomb and trithorax group, epigenetic regulation of development</li><li>• Analyses of epigenetic high throughput data</li><li>• cell culture, protein biochemistry, protein purification, pull-down, qPCR</li><li>• immunohistochemistry/immunofluorescence microscopy</li><li>• generation of probes to mark epigenetic states (next generation epigenetic mapping, CUT &amp; Tag)</li></ul>					
4	<b>Teaching Methods</b> Lectures; Practical/Lab (Project work); Seminar; Guidance to independent research; Training on presentation techniques in oral and written form					
5	<b>Prerequisites</b> Enrolment in the Master's degree course "Biochemistry and Molecular Medicine" or a similar master program.					
6	<b>Type of Examination</b> The final examination consists of three parts (Type BC7): Oral examination (50% of the total module mark), seminar talk (25% of the total module mark), and written report (25% of the total module mark)					
7	<b>Credits Awarded</b> Regular and active participation; Each examination part at least "sufficient" (see appendix of the examination regulations for details)					

<b>8</b>	<b>Compatibility with other Curricula</b> Related master programs based on availability.
<b>9</b>	<b>Proportion of Final Grade</b> 10%
<b>10</b>	<b>Module Coordinator</b> Prof. Dr.Dr. Michal-Ruth Schweiger, phone 0221 478-96846, <a href="mailto:mschweig@uni-koeln.de">mschweig@uni-koeln.de</a>
<b>11</b>	<b>Further Information:</b> <b>Participating faculty:</b> Prof. Dr.Dr. Michal-Ruth Schweiger, phone 0221 478-96846, <a href="mailto:mschweig@uni-koeln.de">mschweig@uni-koeln.de</a> Dr. R.Hänsel-Hertsch, phone 0221 478 96988, <a href="mailto:robert.haensel-hertsch@uni-koeln.de">robert.haensel-hertsch@uni-koeln.de</a> Dr. S. Poepfel, phone 0221 478-96987, <a href="mailto:schweiger@uni-koeln.de">schweiger@uni-koeln.de</a> Andreas Beyer (only lectures), Axel Hillmer, Ina Huppertz, Margarete Odenthal (only lecture), Alicja Pacholewska, Roland Schwarz, Achim Tresch, David Vilchez. <b>Literature:</b> • Allis C.D., Caparros M.L., Jenuwein T., Reinberg D., Lachner M. Epigenetics, 2nd edition, Cold Spring Harbor Laboratory Press, U.S. <b>Note:</b> The module contains individual hands-on laboratory work and is taught in research laboratories. The lab part will be held at the PI's primary location at 1. Center for Molecular Medicine Cologne, 2. Institute for Pathology, 3. Dep.III of Internal Medicine, 4. Cologne Center for Genomics, 5. Institute for Translational Epigenetics, 5. MPI <b>General time schedule:</b> Weeks 1-6: Practical phase; Week 7: Preparation for the oral examination

\* max 8 students from the Master's degree course "Biochemistry and Molecular Medicine"