

## Module description

<b>Module name</b> Stem Cell Biology and Epigenetics					
<b>Modul No.</b> 10-12-0101	<b>Credit points</b> 15 CP	<b>Workload</b> 450 h	<b>Self-study</b> 206 h	<b>Duration</b> 1 Semester	<b>Offered</b> Every 2nd Semester
<b>Language</b> English			<b>Responsible persons</b> Prof. Dr. Cristina Cardoso, Prof. Dr. Ulrike Nuber		
<b>1</b>	<b>Module courses</b>				
	<b>Course No.</b>	<b>Course name</b>	<b>(CP)</b>	<b>Teaching form</b>	<b>Hours per week</b>
	10-12-0101-vl	Stem Cell Biology and Epigenetics- Lecture	3	Lecture	2
	10-12-0101-se	Stem Cell Biology and Epigenetics - Seminar	2	Seminar	2
	10-12-0101-pr	Stem Cell Biology and Epigenetics - Practical Lab Course	10	Practical Lab Course	18
<b>2</b>	<p>Teaching syllabus:</p> <p><b>Lecture:</b> The lecture is based on research publications on stem cell biology and epigenetics. In particular the following topics are presented and discussed: replication of the (epi)genome; gene expression, reprogramming and lineage conversion, epigenetics and chromatin.</p> <p><b>Seminar:</b> In these topics, project ideas are planned for practical execution in the laboratory. The project drafts are presented at the beginning in the form of a road-map and the results of the experiments are presented and discussed at the end of the module in the form of a poster or oral presentation.</p> <p><b>Practical Lab Course</b> Own projects are developed in small groups and pursued in the following weeks. The projects are located within the field of stem cell biology and epigenetics and focus, e.g., on the following methods:</p> <ul style="list-style-type: none"> <li>• Application of biological databases</li> <li>• Planning/generation of mammalian expression vectors, CRISPR/Cas9 constructs</li> <li>• Gene expression analyses and FISH</li> <li>• Domain mapping of chromatin factors</li> <li>• In vitro protein-protein interactions (Co-immunoprecipitation)</li> <li>• In vivo protein-protein interactions (Mammalian Two-Hybrid</li> </ul>				

	<p>Assay)</p> <ul style="list-style-type: none"> <li>• Cell culture and differentiation</li> <li>• Transient and stable transfection of mammalian cells and reporter cell lines</li> <li>• Immunofluorescence and live cell microscopy, protein dynamics (FRAP...)</li> </ul>
3	<p>To gain a basic understanding of epigenetic mechanisms.  To understand the relevance of maintaining as well as changing the epigenetic landscape and transcription factor hierarchies for the stability of cell types, for the reprogramming of somatic cells into induced pluripotent stem cells (iPSCs) and for direct cell lineage conversion/transdifferentiation.  To present research publications and to critically evaluate published research data in the field of stem cell biology and epigenetics.  To be able to design cell and molecular biological experiments and to analyze, interpret and present experimental results.</p>
4	<p><b>Requirements:</b>  Advanced knowledge in cell biology, molecular biology, molecular genetics, biochemistry</p>
5	<p><b>Exam:</b>  Oral/Written exam (graded)  Accomplishment 1: „continuous assessment“ of lab notebook and lab work (graded)  Accomplishment 2: Roadmap and Poster presentations (graded).</p>
6	<p><b>Prerequisites for credit points</b>  Passed exam and accomplishments 1 + 2</p>
7	<p><b>Grading</b>  Standard BWS, Written exam (1/3), Accomplishment 1 (1/3)  Accomplishment 2 (1/3)</p>
8	<p><b>This Module can be part of</b>  Technical Biology (M.Sc.)  Biomolecular Engineering (M.Sc.)</p>
9	<p><b>Literature:</b>  <u>General cell biology text books, e.g.:</u></p> <ul style="list-style-type: none"> <li>• Alberts, Molecular Biology of the Cell</li> <li>• Lodish, Molecular Cell Biology</li> <li>• Pollard and Earnshaw, Cell Biology</li> </ul> <p><u>Epigenetics text books, e.g.:</u></p> <ul style="list-style-type: none"> <li>• Allis et al; Epigenetics</li> <li>• Misteli and Spector; The Nucleus</li> <li>• Cook ; Principles of Nuclear Structure and Function</li> </ul> <p><u>Internet material:</u></p> <ul style="list-style-type: none"> <li>• Databases (<a href="http://www.ncbi.nlm.nih.gov/sites/entrez">http://www.ncbi.nlm.nih.gov/sites/entrez</a>; <a href="http://www.ensembl.org">www.ensembl.org</a>)</li> <li>• Light Microscopy <a href="http://www.microscopy.fsu.edu/primer/index.html">http://www.microscopy.fsu.edu/primer/index.html</a></li> </ul>

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**Comments**

All relevant information and schedules can be found in Moodle / TUCaN