Program of Studies:	**Master Program Bioinformatics**
Name of the module:	**Cellular Programs**
Abbreviation:	**B-M-5**
Subtitle:	-
Modules:	Lecture: 2 h (weekly) Tutorial: 1 h (2 h biweekly)
Semester:	1st to 3rd semester / every third semester
Responsible lecturer:	Prof. Dr. Volkhard Helms
Lecturer:	Prof. Dr. Volkhard Helms
Language:	English
Level of the unit/ Mandatory or not:	Graduate course / mandatory elective
Total workload:	150 h = 48 h of classes (lecture and tutorial), 102 h of private study, for solving assignments, and for preparation of presentation
Credits:	5
Entrance requirements:	no formal requirements, but solid prior knowledge about - cellular networks - genetics - cell biology - omics technologies
Aims/Competences to be developed:	- Topics to be covered: circadian rhythms, cell cycle, stem cell differentiation, cancerogenesis - The aim of this course is to enter deeply into various details of these fields and to understand that they are deeply interconnected - Students learn to read original scientific publications efficiently and to reflect what has been shown there - Students present content of one paper in team of 3 during the lecture, this strengthens their presentation skills - Students practice to discuss about science
Content:	biological content: - circadian rhythms - cell cycle - cell differentiation/cell reprogramming - development of cancer bioinformatics content: - gene expression analysis - DNA methylation analysis - time series analysis - gene ontology and pathway annotation - interaction networks - application of clustering techniques - construction of gene-regulatory networks

Assessment/Exams	- There will be n=6 biweekly assignments. Students need to answer questions and write short essays about topics covered in the lecture and in assigned research papers. There are three possible grades: excellent, pass, failed. Students need to get a “pass” grade on at least n-1 assignments or n-3 “pass” and one “excellent” grade to be admitted to the final exam. - A written final exam of 120 min. will be offered at the end of the semester. - Students need to present at least once during the lecture on the content of an assigned research paper (20 min. presentation and 10 min. discussion).
Grade:	An averaged score will be computed from the mark of the final exam (counts 2/3) and the graded presentation (counts 1/3). This yields the grade of certification.
Literature:	To be announced in the lecture