Program of Studies:	**Master Program Bioinformatics**
Name of the module:	**Systems and Synthetic Biology**
Abbreviation:	**B-M-3**
Subtitle:	-
Modules:	Lecture: 2 h (weekly)
Semester:	2nd semester / every summer semester
Responsible lecturer:	Prof. Dr. Christoph Wittmann
Lecturer:	Prof. Dr. Christoph Wittmann
Language:	German and English
Level of the unit/ Mandatory or not:	Graduate course / mandatory elective
Total workload:	90 h = 30 h of classes and 60 h private study
Credits:	3
Entrance requirements:	None
Aims/Competences to be developed:	- Learning the most important concepts and technologies in the field of systems biotechnology and synthetic biotechnology - Acquiring the ability to analyze biological systems using omics methods (genome, transcriptome, proteome, metabolome, fluxome). - Learning about conceptual strategies for optimizing cell factories - Gaining competences to create metabolic networks based on relevant databases and scientific literature - Acquisition of competences in network modeling with appropriate software (e.g. Cell-Net-Analyzer) for predictions of performance, essential metabolic pathways and optimization options - Literature research, scientific presentation and discussion
Content:	- Introduction and definitions - Microbiological metabolism and cell functions - Metabolic and regulatory networks - “The world of OMICS” – global analysis of biological systems - Genetic engineering and synthetic biology - Strategies and concepts for stem optimization - Industrial examples
Assessment/Exams	Written exam

Grade:	Exam
Literature:	- Metabolic Engineering (Stephanopoulos, G., Aristidou, A., Nielsen, J., 1998, Academic Press) - Bioreaction Engineering Principles (Villadsen, J., Nielsen, J., Lidén, G., Springer, 2003) - The Metabolic Pathway Engineering Handbook (Schmolke, CRC Press, 2009) - Systems Metabolic Engineering (Wittmann, C., Lee, SY., Springer, 2012) - Industrial biotechnology: Microorganisms (Wittmann, C., Liao, JC, Wiley-VCH, 2016) - Industrial biotechnology: Processes (Wittmann, C., Liao, JC, Wiley-VCH, 2016)