

Program of Studies:	Master Program Bioinformatics
Name of the module:	Systems and Synthetic Biology (Metabolic Engineering)
Abbreviation:	B-M-3
Subtitle:	-
Modules:	Lecture, tutorial, and seminar
Semester:	Once every two years
Responsible lecturer:	Prof. Dr. Christoph Wittmann
Lecturer:	Prof. Dr. Elmar Heinzle, Prof. Dr. Christoph Wittmann
Language:	English; Script: German
Level of the unit/ Mandatory or not :	Graduate course / mandatory elective
Course type/weekly hours:	Lecture: 2 h (weekly) Tutorial: 1 h (weekly) Seminar: 1 h (weekly)
Total workload:	180 h = 60 h of classes and 120 h private study and assignments
Credits:	6
Entrance requirements:	Familiarity with the contents of Biochemistry I (note: familiarity with the contents of Organic Chemistry and Biochemistry from the Bioinformatics curriculum is NOT sufficient), Molecular Biotechnology I, Introduction to Biotechnology, and Bioinformatics 3.
Aims/Competences to be developed:	Principles and techniques of system and synthetic bio(tech)nology

Content:	<ul style="list-style-type: none"> - Introduction and definitions - Microbiological metabolism and cell functions - Metabolic networks - Regulatory networks - The world of OMICS – global analysis of biological systems - Genetic engineering and synthetic biology - Industrial optimization of strains and systems metabolic engineering - New drugs and therapeutics - Sustainable bioindustry – chemicals, materials, fuels - Make <i>E. coli</i> see light and dance <p>Excercises: network analysis (e.g. elementary modes, metabolic flux analysis)</p>
Assessment/Exams:	written exam, project work
Used media:	Lecture, tutorial, MATLAB
Literature:	Metabolic Engineering (Stephanopoulos et al., 1999, Academic Press)