

SCIENTIFIC AND METHOD MODULES

Module name	From Biomolecules to Cells		
	Manipulation, Understanding and Application of Microbial Consort		
Number	2022-T5		
Aims	This module provides biochemistry, biophysics and molecular biology to manipulate cells and use them as smallest bioreactors. It provides a understanding how the cellular machinery changes when intracellular proteins ar changed or molecules are added from the extracellular side, includin internalisation, trafficking and cell-specific targeting.		
Basics	covered in basic modules B1–B3 (cell and molecular biology, cell compartments, function of the cytoskeleton, DNA transcription and translation, protein folding, expression and trafficking, biochemistry, recombinant DNA)		
Contents	Cell compartments and their functions (cytoskeleton, cell membrane, Golgi, endoplasmic reticulum, mitochondria, role in various cell types), Biophysical techniques (characterise cells [AFM, optical tweezers]), manipulation of cell growth [modulation of substrate stiffness, mechanotransduction], orientation with physical and chemical tools [durotaxis, printing of chemical gradients], application of cell manipulation in biosensor technology), Eukaryotic cell culture (expression of proteins, 2D and 3D tissue culture, comparison of primary versus tumour cells, methods to modulate cells recombinantly, genetic modification, transfection methods), Signal transduction, Synthesis and screening of bioactive molecules (tests for agonist/antagonistic compounds, consequences for development of molecules, theoretical methods for molecular pharmacology).		
Methods	Techniques to characterise cells (microscopy, staining, optical analysis, transfection to create artificial cells with different activities), Assays to study biological activity, binding, signal transduction (fluorescence-based methods, radioactive assays, impedance spectrometry), Modification of cell substrates (stiffness, nanocontact printing, electronic devices), Cell manipulation (AFM, optical and magnetical traps), Cell sorting (FACS, magnetic sorting).		
Туре	Two-day block course / bi-yearly recurrence with modification		
Date (month/year)	16./17.6.2022		
Time			
Work load	15 hours presence/ 45 hours self-study		
Examination	Written		
Credit points	2		
Responsible scientists	T. Pompe		
(Inter)national guest lecturers	Prof. H. C. Bernstein, Prof. K. Bühler, Dr. C. Dusny, JunProf. A. Grünberg, Prof. O. Hallatschek, Dr. R. Karande, Prof. T. Pompe, Dr. L. Renner		
Industrial partners			
Recommendations for literature, e- learning			

SCHEDULE for Module 2022-T5

Place: Seminar room 115, Chemistry Main Building, Leipzig University, Johannisallee 29

Time	Lecturer	Programme	Location	
16.6.2022				
9:30-10:45	O. Hallatschek / UL	Evolution of microbial consortia	presence	
11:00-12:15	A. Grünberger / Uni Bielefeld	Microbial behavior at fluctuating environments: Technology and application	presence	
14:00-15:15	L. Renner / IPF Dresden	Growth control of microbial cells	presence	
15:30-16:45	T. Pompe / UL	Biomaterials engineering of microbial cell's microenvironments	presence	
17.6.2022				
9:30-10:45	C. Dusny / UFZ	Microscale analysis of microbial (co-)cultures	presence	
11:00-12:15	K. Bühler / UFZ	Cell-cell signalling in microbial biofilms	presence	
14:00-15:15	HC Bernstein / UiT (N)	Engineering microbial consortia: design, test, build and learn	online	
15:30-16:45	R. Karande / UL	Current applications and future potential of microbial consortia	presence	

Didactic elements:

Lecture and discussions

Expected performance: Active participation in discussions