

7.15 Medicinal Chemistry

Module Name Medicinal Chemistry		Module Code CO-420	Level (type) Year 2 (CORE)	CP 5
Module Components				
Number	Name		Type	CP
CO-420-A	Medicinal Chemistry		Lecture	5
Module Coordinator Detlef Gabel	Program Affiliation • Medicinal Chemistry and Chemical Biology (MCCB)		Mandatory Status Mandatory for MCCB Mandatory elective for Chemistry	
Entry Requirements <i>Pre-requisites</i> <input checked="" type="checkbox"/> General Biochemistry <input checked="" type="checkbox"/> General Organic Chemistry		Frequency Annually Duration 1 semester	Forms of Learning and Teaching • Lecture (35 hours) • Tutorial Lecture (10 hours) • Private Study Lecture (80 hours) Workload 125 hours	
Recommendations for Preparation Early reading, extensive note taking and self-testing, work through practice problems, fully understand the material before entering class, attend voluntary tutorials				
Content and Educational Aims This module provides an insight into the design of drugs, their interactions with targets, the role of selected targets in selected diseases. It will introduce the concepts of isosteres and bioisosteres. The physical basis of interactions between drugs and targets will be explained. Methods for determining site and strength of binding of drugs to targets will be presented. The optimization of a lead compound to a drug will be detailed. Assay systems for drug optimizations will be presented. The path of drugs from the design to clinical use will be followed. The concept of pharmacophor will be presented. Stereochemical aspects of drug design will be discussed. Rules for drug design and fragment-based drug design will be explained. The ADME concept will be introduced. LD50 and ED50, as well as dose-response curves, will be presented. Structure-activity relationships will be discussed.				
Intended Learning Outcomes By the end of the module, the student will be able to <ol style="list-style-type: none">propose a series of isosteres and bioisosteres for common functional groups;understand the principles of testing affinities of drugs to targets;analyze the interaction potential of drugs with their targets;sketch the path of a drug from lead structure to clinical trial;differentiate between conventional and fragment-based drug design;propose ways to identify targets on which specific molecules actestimate the changes in structure and its effect on ADME;extract information about structure-activity relationships from a given research paper on drug design;explain the testing methods employed in the paper;explain changes in interaction potentials for given modifications of a compound;explain the role of the drug in the disease and identify the role of the target.				
Usability and Relationship to other Modules				

7.5 Microbiology

Module Name Microbiology		Module Code CO-400	Level (type) Year 2 (CORE)	CP 7.5
Module Components				
Number	Name		Type	CP
CO-400-A	Microbiology		Lecture	5
CO-400-B	Microbiology Lab		Lab	2.5
Module Coordinator Matthias Ullrich	Program Affiliation • Biochemistry and Cell Biology (BCCB)		Mandatory Status Mandatory elective for BCCB	
Entry Requirements		Frequency	Forms of Learning and Teaching	
Pre-requisites	Co-requisites	Knowledge, Abilities, or Skills	annually	<ul style="list-style-type: none">• Lecture (35 hours)• Tutorials (15 hours)• Private Study (75 hours)• Safety instructions (1 hour)• Reading lab manuals (6 hours)• MSDS preparation (4 hours)• Experimental work in the laboratory, including seminars (27.5 hours)
<input checked="" type="checkbox"/> General Biochemistry and General Cell Biology	<input checked="" type="checkbox"/> None	<ul style="list-style-type: none">• Basic knowledge in biochemistry and cell biology• Basic laboratory skills in biochemistry and cell biology• S1 safety instructions		<ul style="list-style-type: none">• Lab report writing (24 hours)
		Duration	Workload	
		1 semester	187.5 hours	
Recommendations for Preparation				
Students should have a sound background in biochemistry and cell biology that they acquired by attending the respective CHOICE modules. They should have understood the basic structure and function of biomolecules, and general principles by which cells multiply and interact with each other. Furthermore, students should have acquired basic skills in experimental molecular biology techniques from the respective CHOICE laboratory courses.				
Content and Educational Aims				
This Microbiology CORE module consists of two module components, one lecture and one laboratory course:				
There is no higher life form without microbes, but there are plenty of microbes without higher life forms. Microorganisms are present wherever life is possible. Microbes are conducting the most diverse biochemical processes and are found anywhere in our natural and manmade surroundings. The lecture introduces principles of the world of microorganisms, discussing their diversity and analyzing how microbes act in the environment or on human health. Bacteria, archaea, fungi, protozoa, and viruses are dealt with in the context of human health, environmental processes, or food manufacturing. Taxonomy will be analyzed with respect to different characteristics, including presence and activity within various cellular compartments, or special biochemical features. The lecture addresses the diverse biochemical life styles of microbes – from photosynthesis via biofilms and methanogenesis to pathogenicity. The role of microbes for the cycling of elements on our planet will be exemplarily demonstrated for carbon, nitrogen and sulfur. Basic differences between microbes and their hosts will be delineated in order to equip the students with knowledge about ways how to defeat microorganisms.				

7.21.2.4 Global Health – Historical context and future challenges

Module Name			Module Code	Level (type)	CP
Big Questions: Global Health – Historical context and future challenges			JTBQ-BQ-004	Year 3 (Jacobs Track)	5
Module Components					
Number		Name		Type	CP
JTBQ-004		Global Health – Historical context and future challenges		Lecture	5
Module Coordinator		Program Affiliation		Mandatory Status	
A. M. Lisewski		<ul style="list-style-type: none">Jacobs Track - Big Questions		<ul style="list-style-type: none">Mandatory elective for students of all undergraduate study programs except IEM	
Entry Requirements			Frequency	Forms of Learning and Teaching	
Pre-requisites			annually	<ul style="list-style-type: none">Lectures (35 hours)Private Study (90 hours)	
<input checked="" type="checkbox"/> None			Duration	Workload	
<input checked="" type="checkbox"/> None			1 semester	125 hours	
<div><div>Knowledge, Abilities, or Skills</div><ul style="list-style-type: none">the ability and openness to engage in interdisciplinary issues of global relevancemedia literacy, critical thinking and a proficient handling of data sources</div>					
Recommendations for Preparation					
Critical following of the media coverage on the module’s topics in question.					
Content and Educational Aims					
All “Big Questions” (BQ) modules deal with the economic, technological, societal and environmental contexts of the global issues and challenges of the coming decades. The BQ modules intend to raise awareness of those challenges and broaden the students’ horizon with applied problem solving beyond the borders of their own disciplines. Knowledge and skills offered in the interdisciplinary BQ modules support students in their development to become an informed and responsible citizen in a global society.					
This module gives a historical, societal, technical, scientific and medical overview over the past and future milestones and challenges of global health. Particular focus is on future global health issues in a world that is interconnected both through mobility and through communication networks. Presented are the main milestones along the path to modern health systems, including the development of public hygiene, health monitoring and disease response, and health related breakthroughs in science, technology, and economy. Focus is given to children, maternal and adolescent health, as these are most critical to the well-being of next generations. The module also provides key concepts in global health, epidemiology and demographics such as the connection between a society’s economical level and its population’s health status, measures of health status, demographic and epidemiologic transitions, as well as modern issues such as the growing fragmentation (to a personal level) of disease conditions and the resulting emergence of personalized medicine. Finally, attention is also given to publicly less prominent global health issues, such as re-emergent diseases, neglected tropical diseases, and complex humanitarian crises.					