

Program of Studies:	Master Program Bioinformatics
Name of the module:	Optimization
Abbreviation:	I-M-6
Subtitle:	Core lecture
Modules:	Lecture 4 h (weekly) Tutorial 2 h (weekly)
Semester:	1 st -3 rd Semester / At least once every two years
Responsible lecturer:	Dean Computer Science
Lecturer:	Dr. Fritz Eisenbrand
Language:	English
Level of the unit/ Mandatory or not :	Graduate course / mandatory elective
Course type/weekly hours:	Lecture 4 h (weekly) Tutorial 2 h (weekly) Tutorials in groups of up to 20 students
Total workload:	270 h = 90 h of classes and 180 h private study
Credits:	9
Entrance requirements:	For graduate students: none
Aims/Competences to be developed:	The students learn to model and solve optimization problems from theory as from the real world
Content:	<ul style="list-style-type: none"> - Linear Programming: Theory of polyhedra, simplex algorithm, duality, ellipsoid method - Integer linear programming: Branch-and-Bound, cutting planes, TDI-Systems - Network flow: Minimum cost network flow, minimum mean cycle cancellation algorithm, network simplex method - Matchings in graphs: Polynomial matching algorithms in general graphs, integrality of the matching polytope, cutting planes - Approximation algorithms: LP-Rounding, greedy methods, knapsack, bin packing, steiner trees and forests, survivable network design

Assessment/Exams:	<ul style="list-style-type: none"> - Regular attendance of classes and tutorials - Solving accompanying exercises, successful participation in midterm and final exam - Grades: Yes - The grade is calculated from the above parameters according to the following scheme: 20%, 30%, 50% <p>A re-exam takes place during the last two weeks before the start of lectures in the following semester</p>
Used media:	<p>Practical exercises supplement the theoretical exercises. The lecture is accompanied with a difficult real-world optimization problem which is solved by the students in teams within the scope of an optimization contest.</p>
Literature:	<ul style="list-style-type: none"> - Bernhard Korte, Jens Vygen: Combinatorial Optimization, Theory and Algorithms, Springer Verlag, 2001 - Alexander Schrijver: Theory of Linear and Integer Programming, Wiley-Interscience, 1986 - Alexander Schrijver: Combinatorial Optimization, Springer Verlag, 2002