General Information			
Course name	Computational Modeling in Systems Biology	**ECTS Credits**	3
		Semester	W

Aims

To provide an overview of the computational techniques and achievable results in the emerging field of systems biology.

Content

Basics of molecular modeling. Physical structure of biopolymers. Foldamers, Levinthal paradox and Anfinsen principle. Essentials of molecular modeling and molecular simulations. Examples of procedures and their results. Biological polymers as sequences. Sequence comparision. Biological databases of sequences, acces and work. BLAS, FASTA, scoring matrices. Sugar code as an example of non-linear code. Examples of use and results. Molecular interaction networks, modeling of reaction kinetics. Application of graph-based approaches. Stochastic and deterministic modeling. Typical examples of use. Outlines and perspectives of systems biology and systems medicine. Chalenges of synthetic biology.

Assessment Methods and Criteria

Solving intermediate motivating challenges given at the lectures. Exam.

Grading Scale (in %):
A: 91% - 100%
B: 81% - 90%
C: 71% - 80%
D: 61% - 70%

E: 51% - 60%
F: 0% - 50%

Grading System:

The University recognises the following six degrees for the evaluation of the study results:
a) A – excellent (excellent results) (numerical value 1)
b) B – very good (above average results) (1.5)
c) C – good (average results) (2)
d) D – satisfactory (acceptable results) (2.5)
e) E – sufficient (results meet the minimum criteria) (3)
f) FX –failed (requires further work) (4)

Bibliography

Alon, Uri. An Introduction to Systems Biology: Design Principles of Biological Circuits*. 1st ed. Chapman and Hall/CRC, 2006.

Campbell, A. Malcolm, and Laurie J. Heyer. *Discovering Genomics, Proteomics and Bioinformatics*. 2nd ed. Benjamin Cummings, 2006.

Gabius, Hans-Joachim. *The Sugar Code: Fundamentals of Glycosciences*. Wiley-VCH, 2009.