Statistical and Biological Physics

Module No.: MN-P-SP-StatBio, MN-P-PN-StatBio, MN-P-WaMa   Version: 21.06.2017 BM

Course: Introduction to Network Science

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Category	Type	Language	Teaching Hours	CP	Semester
Specialized Course	Lecture	English	2+1	4.5	SoSe

Requirements for participation:
Statistical Mechanics on the bachelor level

Type of module examinations:
Oral Examination or Term Paper

Duration of the course:
1 semester

Aims of the course:

Acquaintance of mathematical and computational methods for networks analysis. Ability to model real-world systems from different areas of science and technology and to apply the mathematical methods. Understanding of how the structure of a network determines its function and stability.

Contents of the course:
- ➤ Mathematical description of networks. Basic tools from graph theory
- ➤ Structure of real-world networks: Small-world effect, scale-free networks
- ➤ Percolation and network resilience
- ➤ Diffusion and Spreading on networks. Applications to epidemiology
- ➤ Physics of supply networks, esp. power grids

Recommended literature:

M.E.J. Newman, Networks - An Introduction (Oxford University Press 2010)