Statistical and Biological Physics

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

Course: Statistical physics of disordered systems, information, and inference

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Category	Type	Language	Teaching Hours	CP	Semester
Core Course	Lecture	English	3+1	6	WiSe
Core Course	Lecture + Seminar	English	4+1	7.5	WiSe

Requirements for participation:

Advanced Statistical Mechanics

Type of module examinations:

Oral Examination

Duration of the course:

1 semester

Aims of the course:

Understanding the basis of information theory and the physical basis of information processing, inference and its links with the statistical physics of disordered systems.

Contents of the course:

- ➢ Information entropy
- ➢ Physics of information processing: Landauer's principle
- ➢ Bayesian inference
- ➢ message passing
- ➢ disordered systems and replica theory

Recommended literature:

Cover and Thomas, Elements of Information Theory (Wiley)
MacKay, Information theory, Inference and Learning Algorithms (CUP)
Barber, Bayesian Reasoning and Machine Learning, (CUP)
Mézard and Montanari, Information, Physics, and Computation (OUP)