# Statistical and Biological Physics

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

# Course: Biological Physics II: Systems

**Lecturers: T. Bollenbach, B. Maier**
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| Category | Type | Language | Teaching Hours | CP | Semester |
|---|---|---|---|---|---|
| Core Course | Lecture | English | 3+1 | 6 | SoSe |
| Core Course | Lecture + Seminar | English | 4+1 | 7.5 | SoSe |

**Requirements for participation:**

Bachelor in Physical Sciences; participation in Biological Physics I strongly recommended.

**Type of module examinations:**

Oral Examination

**Duration of the course:**

1 semester

**Aims of the course:**

Introduction to nonlinear dynamics; structure and dynamics of biological networks; building and analyzing theoretical models of biological systems; understanding the causes and consequences of molecular number fluctuations in living systems; principles of pattern formation in multicellular systems.

**Contents of the course:**

➢ Dynamical systems
➢ Dynamics of small regulatory networks
➢ Noise in gene expression
➢ Statistical analysis of large biological networks
➢ Biological pattern formation
➢ Reaction-diffusion systems
➢ Empirical laws in biology

**Recommended literature:**

Phillips, R., Kondev, J., Theriot, J., H. Garcia, Physical Biology of the Cell, Garland Science, New York, 2013

Strogatz, S.H., Nonlinear Dynamics and Chaos, Westview Press, Boulder, CO, 2014

Boccaletti S, Latora V, Moreno Y, Chavez M & Hwang D (2006) Complex networks: Structure and dynamics. Phys. Rep. 424: 175–308 Available at:
http://linkinghub.elsevier.com/retrieve/pii/S037015730500462X