

**Modules:**

physics700 **Elective Advanced Lectures**  
 physics730 **Theoretical Physics**

**Course:**

## Nonequilibrium physics with interdisciplinary applications (T)

**Course No.:**

Category	Type	Language	Teaching hours	CP	Semester
Elective	Lecture with exercises	English	2+1	4	ST

**Requirements:****Preparation:**

Statistical mechanics

**Form of Testing and Examination:**

Oral examination or term paper

**Length of Course:**

1 semester

**Aims of the Course:**

Acquaintance with basic concepts of nonequilibrium physics; ability to apply the basic methods for the investigation of nonequilibrium problems; application of physics-based models to interdisciplinary problems.

**Contents of the Course:**

Principles of nonequilibrium physics

Stochastic systems and their description (master equation, Fokker-Planck equation,...)

Analytical and numerical methods

Nonequilibrium phase transitions

Applications to traffic, pedestrian dynamics, economic systems, biology, pattern formation,...

**Recommended Literature:**

A. Schadschneider, D. Chowdhury, K. Nishinari: Stochastic Transport in Complex Systems (Elsevier, 2010)

P.L. Krapivsky, S. Redner, E. Ben-Naim: A Kinetic View of Statistical Physics (Cambridge University Press, 2010)

V. Privman (Ed.): Nonequilibrium Statistical Mechanics in One Dimension (Cambridge University Press, 1997)

N.G. Van Kampen: Stochastic Processes in Physics and Chemistry (Elsevier, 1992)