

Module No.	Title of Module
10-MAT-MPDST	Discrete Stochastic Models in Physics
Recommended for	3rd semester of Int. Master Program Math. Phys.
Duration	1 Semester
Frequency	Every Winter Semester biannually
Course types	(1) Lecture „Discrete Stochastic Models in Physics" (2 SWS) = 30 h in class + 120 h individual studies = 150 h (2) Seminar „Discrete Stochastic Models in Physics" (2 SWS) = 30 h in class + 120 h individual studies = 150 h
Workload	10 LP = 300 h
Aims	After active participation, the students are able to understand the basic methods and terms of large stochastic systems (e.g. Gibbs measures, relative entropy, large deviation functionals) and apply them. They can solve minor problems on their own or in groups and check proofs for completeness.
Contents	One or more of the following topics: <ul style="list-style-type: none"> - Phase transitions in spin systems - Large deviations - Metastable states - Random matrices <p>Lectures and seminars will be held in English. Students' performance has to be in English as well.</p>
Prerequisites	None
Literature	Dembo, A. and Zeitouni, O.: Large Deviations Techniques and Applications. 2nd ed., New York: Springer 1998. Friedli, S. and Velenik, Y.: Statistical mechanics of lattice systems: A concrete mathematical introduction. 2016 Tao, T.: Topics in random matrix theory. Providence: Amer. Math. Soc. 2012. Bovier, A. and den Hollander, F.: Metastability. A potential-theoretic approach. Cham: Springer 2015.
Examinations	Oral exam of 25 min Oral lecture (60 min.) + written report (4 weeks).
Requirements	attendance at lecture „Discrete Stochastic Models in Physics" (2 SWS) participation in seminar „Discrete Stochastic Models in Physics" (2 SWS)