Module title			Abbreviation
FOKUS Research Module Complex Systems with Mini Research Project			11-FM-PKS-MF-092-m01
Module coordinator		**Module offered by**	
chairperson of examination committee		Faculty of Physics and Astronomy	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
12	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	graduate	--	

Contents

Specific and advanced knowledge for independent scientific work in a current research area, especially in the specialist field of Complex Systems, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.). - Statistical mechanics and information theory. - Non-linear dynamics: Deterministic chaos, synchronisation, chaotic lasers. Encoding, chaotic networks. - Critical phenomena: Scaling law, phase transformations, Monte Carlo simulation. Random walk, stochastic processes beyond the thermal equilibrium.

Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in the field of physics of complex systems. They know and are able to apply the methods of Statistical Physics and non-linear dynamics, which are used to describe physics of complex systems, to current questions. They have acquired advanced knowledge of a specialist field and prove their knowledge in a seminar presentation. They are able to successfully implement the acquired knowledge and methods in a mini research project.

Courses (type, number of weekly contact hours, language — if other than German)

Physik komplexer Systeme (Physics of Complex Systems): V (2 weekly contact hours) + Ü/P (2 weekly contact hours), German or English, once a year (winter semester)
Kompaktseminar Komplexe Systeme (Block Taught Seminar Complex Systems): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)
Miniforschungsprojekt Komplexe Systeme (Mini Research Project Complex Systems): P (2 weekly contact hours), German or English, details on availability to be announced (either block taught during semester break or approx. 3 weeks part time)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

This module has the following assessment components
1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 through 3 will be offered in German or English.
Students must register for assessment components 1 through 3 online (details to be announced).
Assessment component 1 will be offered once a year in the winter semester; details on when assessment components 2 and 3 will be offered to be announced.
To pass this module, students must pass each of the assessment components 1 through 3.

Allocation of places

--

Additional information

--

Referred to in LPO I (examination regulations for teaching-degree programmes)
--
Module appears in
Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011)