**Critical Phenomena**

**Module title:** Critical Phenomena  
**Abbreviation:** 11-CRP-131-m01

**Module coordinator:** Managing Director of the Institute of Theoretical Physics and Astrophysics  
**Module offered by:** Faculty of Physics and Astronomy

**ECTS:** 6  
**Method of grading:** Only after succ. compl. of module(s)  
**Numerical grade:** --

**Duration:** 1 semester  
**Module level:** graduate  
**Other prerequisites:** Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

**Contents**

In Statistical Physics, critical phenomena refer to the universal behaviour in the proximity of continuous phase transitions. The theory, which can be explained through critical phenomena, is called renormalisation group and plays an important role in many areas of Physics. The lecture serves as an introduction to critical phenomena and to renormalisation group theory and discusses selected applications. Basic phenomenology: Universality, scaling relationships, critical exponents. Mean field theory. Renormalisation group theory. Duality and high-/low-temperature development. Finite size scaling theory. Exact solutions.

**Intended learning outcomes**

The students know the principles of the theory of critical phenomena and are able to apply the calculation methods to simple problems.

**Courses**

V + R (no information on SWS (weekly contact hours) and course language available)

**Method of assessment**

a) written examination project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks), presentation/seminar presentation (approx. 30 minutes)  
Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.  
Language of assessment: German, English

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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**Module appears in**

Master’s degree (1 major) Physics (2010)  
Master’s degree (1 major) Physics (2011)  
Master’s degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)