# Module: Compulsory Astrophysics I

**Module No.:** astro810

# Course: Cosmology

**Course No.:** astro812

| Category | Type | Language | Teaching hours | CP | Semester |
|---|---|---|---|---|---|
| Required | Lecture with exercises | English | 3+1 | 6 | WT |

**Requirements for Participation:**

**Preparation:**
Introductory astronomy

**Form of Testing and Examination:**
Requirements for the examination (written or oral): successful work with the exercises

**Length of Course:**
1 semester

**Aims of the Course:**
The student shall acquire deep understanding of the foundation of our world models and of their consequences, with special emphasis on the formation of structures in the universe and its physical and observational consequences. The lecture shall enable the student to read and understand original literature in astrophysical cosmology, but also to see the direct connection between the fundamental problems in cosmology and particle physics, such as the nature of dark matter and dark energy

**Contents of the Course:**
Kinematics and dynamics of cosmic expansion, introduction to General relativity, Friedmann equations and classification of world models, flatness and horizon problem; thermal history of the big bang, decoupling, WIMPS, nucleosynthesis, recombination and the CMB; gravitational light deflection, principles and applications of strong and weak gravitational lensing; structure formation in the Universe, perturbation theory, structure growth and transfer function, power spectrum of cosmic fluctuations, spherical collapse model, Press-Schechter theory and generalizations, cosmological simulations, cosmic velocity fields; principles of inflation; lensing by the large-scale structure, cosmic shear; anisotropies of the CMB, determination of cosmological parameters

**Recommended Literature:**
J. A. Peacock; Cosmological Physics (Cambridge University Press 1998)
P. J. E. Peebles; Principles of Physical Cosmology (Princeton University Press 1993)
Handout of the Transparencies