Current subject area(a):
Astrophysics

Status	Course code / number in the book: **TF ????.** **"Nucleogenesis in the Universe"**. Taught by: Bohdan Melekh			
Acad. cycle	**ECTS credits**	**Duration**	**Semester**	**Contact hours**
Magister,	7.5	1 semester	Autumn	64
Year of study	**Weekly lectures/seminars**		**Prerequisites**	
1st - - - -	1 / 1		Nuclear Physics, Stellar Evolution, Nebular Astrophysics, Basics of the Cosmology	
Languages	**Examination**		**Assessment**	
English	Written exam		100-point scale	

Objectives: provide with knowledge concerning the basics of the origin of the chemical elements nuclei from the stellar evolution, explosions of supernova and Big Bang nucleosynthesis, as well as ways of enrichment the interstellar medium with heavy elements, the knowledge of the diagnostic methods to compare the predictions of the nucleosynthesis theories with data of the astronomical observations.

Intended capabilities: to have essential basics of the knowledge on the Nuclear Astrophysics for the practical work, to comprehend the origins of the chemical elements in the Universe through both the stellar nucleosynthesis as well as the explosive one, to assess the age of the supernova remnants, to work on developing the simulations of the chemodynamical evolution and the photoionization modelling with purpose to assess the spatial distribution of elements in the various galaxies, to determine the primordial helium abundance from both the nebular abundances and theory of the Big Bang Nucleosynthesis.

Description. The main aim of Course is to give basic knowledge on the origin of the chemical elements nuclei, and make review of the basics and methods of nuclear astrophysics, required in astrophysical tasks related to the description of physical processes into the stars of various spectral types, during explosion of supernovae as well as in era of Big Bang Nucleosynthesis. Also, the main ways to enrich the interstellar medium by heavy chemical elements as well as diagnostic methods to assess the age of supernova remnants are described. It is shown how results of the nuclear astrophysics can be used in chemodynamical simulations of the galaxies as well as in photoionization modelling of their nebular components.

Reading List:

1. S.E. Woosley & A. Heger The Evolution and Explosion of Massive Stars // Reviews of Modern Physics, Vol. 74, 2002
2. David Tytler, John M. O'Meara, Nao Suzuki & Dan Lubin Reviews of Big Bang Nucleosynthesis and Primordial Abundances // Physica Scripta, 85, p. 12, 2000
3. Heyvaerts, in Late stages of Stellar evolution , edited by C. de Loore, Ecole EADN de Ponte de Lima, Lect. Notes Phys. (Springer Verlag, 1991) 313.
4. Melekh B.Ya. Photoionization analysis of chemodynamical dwarf galaxies simulations / Melekh B.Ya., Recchi S., Hensler G., Buhajenko O.// Monthly Notices of the Royal Astronomical Society. – 2015. – Vol. 450. – Issue 1. – P. 111-127.