Course Unit Descriptor

Study Programme: Master Academic Studies in Physics

Course Unit Title: Cosmology and extragalactic astronomy

Course Unit Code: M18KVA

Name of Lecturer(s): Assistant Professor Dragana Ilic

Type and Level of Studies: Master Academic Degree

Course Status (compulsory/elective): Elective

Semester (winter/summer): Summer

Language of instruction: English

Mode of course unit delivery (face-to-face/distance learning): Face-to-face

Number of ECTS Allocated: 8

Prerequisites: None

Course Aims:

Acquiring general and specific knowledge in cosmology and extragalactic astronomy.

Learning Outcomes:

After the course, the student should have developed the following:

- General competences:

Student can use different astronomical software, search online databases, knows how to plot different data and results, and write the report on specific practical project.

- Specific course competences:

Student has advanced knowledge in extragalactic astronomy: large scale structure, properties of extragalactic objects, observational aspects, catalogues and databases, and is capable for independent scientific research in this field.

Syllabus:

Theory

Short history of extragalactic astronomy from the beginning of the 20th century. Structure and kinematics of the Milky Way. Properties of supermassive black holes and Sgr A*. Galaxy classification and Hubble sequence. Spiral galaxies. Spiral galaxy rotational curves. Elliptical galaxies. Fundamental relations (Tully-Fischer, Faber-Jackson, fundamental plane, luminosity function). Formation and evolution of galaxies. Close encounters and galaxy collisions. Active galactic nuclei (AGN). AGN classification, observational properties and unified model. Gravitational lenses. Galaxy clusters, classification and properties. Intergalactic matter. Cosmological distance scales. Methods for determining cosmological distances. Large scale structure. Contents, history and origin of the Universe. Cosmological redshift. Cosmological models. Cosmological parameters. Observational tests of cosmological models. Dark matter. Dark energy. Big Bang. Evolution of the Universe.

Practice

Catalogues and databases (introduction to different databases, e.g. SDSS, NED, etc., data-mining, classification of extragalactic objects, k-correction, estimate of the mass of the supermassive black hole in AGN).

Required Reading:

1. Carroll and Ostlie, An Introduction to Modern Astrophysics.

2. L.S. Sparke, J.S. Gallagher, Galaxies in the Universe: An Introduction, Cambridge University Press, Cambridge, 2000.

Weekly Contact Hours:	**Lectures:** 3	**Practical work:** 2

Teaching Methods:

Lectures, practical and group work, seminars.

Knowledge Assessment (maximum of 100 points):

Pre-exam obligations	points	**Final exam**	points
Active class participation	10	written exam	
Practical work	40	oral exam	50
Preliminary exam(s)		…….	
Seminar(s)			

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.