Basic/Essential Course Information	
Course title	COSMOLOGY
Degree Course title	Physics (Magistrale)
ECTS	4
Compulsory attendance	NO
Course teaching language	ITALIAN

Teacher	Maurizio Gasperini	gasperini@ba.infn.it

ECTS Details	Disciplinary area	SSD	ECTS
	Characterizing	FIS/02	4

Time management and teaching activity type	Period	Year	Lesson type
	I° semester	2° (magistrale)	Lectures (32h)

Time management	Total hours	In-class study	Out-of-class study hours
	100	32	68

Course calendar	Starting date	Ending date
	24.09.2018	21.12.2018

Syllabus	
Prerequisites	Special and general relativity, elements of physics of the fundamental interactions.
Expected learning outcomes (according to Dublin Descriptors)	• *Knowledge and understanding* Basic knowledge of standard and inflationary cosmology. Understanding of the basic structure of the Universe on large scales of distances. • *Applying knowledge and understanding* Application of the main astrophysical observations and of the theoretical models of fundamental interactions in order to study the dynamics of our Universe and its primordial evolution. • *Making judgements* Ability to discuss and to compare different theoretical models and to look for precision observational tests. • *Transferable Communication skills* Ability to interact with professional people specialized in the field of cosmology and astroparticle physics. • *Lifelong learning skills* Ability to approach the specialistic literature and to work in a multidisciplinary context.

Course contents summary	Introduction to the standard cosmological scenario and discussion of simple examples of inflationary models.
Detailed syllabus	Einstein equations and Riemannian geometry. The metric of Friedmann-Lemaitre-Robertson-Walker: cosmological redshift, particle horizon and event horizon. Perfect fluids as sources of cosmic gravity. The standard cosmological model: the matter-dominated and the radiation-dominated phase. The luminosity-redshift relation: Hubble law and cosmic acceleration. Dark matter, dark energy, flatness and horizon problems. The initial singularity and the exact de Sitter solution. The primordial inflationary era: the inflaton field and the "slow-roll" scenario, simple examples of exact and approximate solutions. Computation of the "e-folding" parameter.
Reference book	M. Gasperini, *Lezioni di Cosmologia Teorica* (Sprinter-Verlag, Milano, 2012).
Notes	All chapters except the last three chapters and the Appendices.
Teaching methods	Class lectures/exercises using blackboard.
Assessment methods	Oral colloquium including exercises and calculation tests to be performed on the blackboard.
Evaluation criteria	**- knowledge and understanding** of the basic aspects of standard and inflationary cosmology; **- ability to perform** simple calculations concerning the main astrophysical observables; **- ability to present and to discuss** with a professional language the current astrophysical observations and their implications for those theoretical models that aim to describe the primordial evolution of our Universe; **- ability to apply** the notions and the working methods learned in this course also to differerent (possibly non-standard) cosmological scenarios.
Other	