Semester	JAN 2022
Open to semester	8,14,22
Course code	**PH4213/PH6444**
Course title	**Cosmology**
Credits	3 /4
Course Coordinator & participating faculty (if any)	Tarun Souradeep
Nature of Course	Lectures
Pre-requisites	Basic Physics courses in Classical mechanics, Quantum mechanics and statistical physics Mathematical method on Physics-I Introductory statistics Introduction to General Relativity and Gravitation extremely desirable, not mandatory
Objectives (goals, type of students for whom useful, outcome etc)	Introductory course on Contemporary Cosmology- Cosmology deals with understanding the content, evolution and origin of the universe using established physical laws. The course will cover basic concepts and techniques of Cosmology. It will emphasise the physics and maths required in the contemporary understanding and avoid a historical perspective. It will be useful for Physics students primarily wishing to explore or pursue Astrophysics and high energy physics.
Course contents (details of topics /sections with no. of lectures for each)	* Primer on General Relativity and Gravitation (5) - spacetime transformations & equivalence principle - Geodesics and Geodesic deviation - Curvature and Einstein equations - Solutions to Einstein equation in weak field - Cosmological solution *Background Universe (5) - model: Friedmann equations and solutions - Observables and Observational tests * Cosmic Thermal History (5) - Equilibrium statistics - evolution, decoupling and freeze out of non-relativistic

	components - thermal evolution of relativistic matter (Microwave Background and other cosmic backgrounds) - observational probes of thermal history *Contemporary cosmological paradigm for the Early Universe (4) - Need for inflation - basic straw-man model of inflation - Primordial seeds of structure formation - global aspects of space-time * Perturbed universe: theory & measures (6) - statistics and measurements of random fields - generation of perturbations from inflation - evolution of matter perturbations - evolution of perturbations in radiation: Cosmic Microwave anisotropy * Status, New directions, Challenges and searches (3)
Evaluation /assessment	End-Sem Examination-50% Mid-Sem Examination-30% Others-20 Assignments + Terms papers for PhD students%
Suggested readings (with full list of authors, publisher, year, edn etc.)	1. Introduction to Cosmology , Barbara Ryden, Cambridge University Press, (2nd Edition, 2016) 2. Modern Cosmology, Scott Dodelson and Fabian Schmidt, (2nd Edition) Elsevier 2021 3. Principles of Physical Cosmology, P J E Peebles, Princeton University Press 1993 Other references will be provided for specific topics.