
Cosmology II

Semester: I I

Title of the Course: Cosmology – II

Course Code: PES 111

ECTS – 4

Credits – 2

Lecturer — Fr. Joy Panamthanam svd. M.A.[Uni. Pune, India] & M.A. (KU Leuven, Belgium)

Class Room – new class room

Consultation times: Mondays 8.00 hours – 10.00 hours

Course Description.

We will continue where we have left from cosmology –I. since the theory of relativity that is concerned about macro world, we shall look into the micro world in quantum theory. Thus both the *micro and macro* levels of our world is grasped so to say. We shall highlight also the effort/s of super string theories to offer one theory combining relativity and quantum theories. The rest of the hours will be dedicated to watching documentaries and discussions thereof. The details are given in the course content.

The Objectives of this course are: -

- Provide a basic grasp of the quantum theory and its problems in relation to the relativity theory and the philosophical issues surrounding the quantum theory.
- Bring to understanding of the students the wonder, beauty, harmony and delicacy of our universe –the wonder of the planets and galaxies and stars etc.
- Bring to awareness through the documentaries about the ecological challenges today, its causes, possible remedies etc. primarily from a Christian view point.
- To make students aware of the complexity of earth and life on this earth.

Learning outcomes.

At the end of the course the students are expected to:

1. Able to appreciate the wonder, complexity, beauty and harmony of the universe, especially of our earth as a source of vibrant life.
2. Able to imaginatively respond to this vibrancy of our experienced universe in a Christian way for our own good and the good of the future generations.

Content:

Refer to the detailed course calendar below

Teaching methodology

- Lectures through power points.
- Active participation and discussion in the class especially the ecological aspects

- Watching relevant documentaries and talk and discussions based on the same.

Course requirements and assessment method.

- Active Participation in the class and attendance assessed . – 10 percent
- Assignment on one's very own tribal cosmogony and its interpretation and significance. – 30 percent
- Written/oral Final examination. 60 per cent marks. – Objective type questions for examination in both the cases.
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Course calendar and Distribution and details of the Content.

Week	Dates	Content
1	8 th – 12 th Jan 2018	Introduction and explanations on course and syllabus & requirements.
2	15 th - 19 th Jan	<u>Quantum theory</u> – introduction- more radical than relativity, the three historical periods of the theory, the issue of black body radiation,
3	22 nd – 26 th Jan	<u>Quantum theory – conti</u> - Max Planck and Niels Bohr. Matter as energy relationships. Dispute of Einstein and Niels Bohr, de Broglie and Schrodinger's theoretical agreements as a boost, Heisenberg's indeterminacy principle and its philosophical consequences.
4	29 th Jan- 2 nd Feb.	<u>Quantum theory – conti</u> - Dirac's re-interpretation of Schrodinger, splitting of atoms and creation of bomb, structure of atoms, different neutrinos, the four major forces of nature,.
5	5 th – 9 th Feb.	<u>Quantum theory – conti</u> - lack of symmetry between relativity and quantum theory, protons and quarks, particle forest of mater, Are quarks the final particle? Suggestions of super string theory. Possible future of superstring theory.
6	12 th – 16 th Feb.	<i>Wonders of universe: The beginning of the Universe</i> : BBC production by Prof. Brian Cox. 2007-8. All these are 50 minutes documentary and then second hour will be discussion of what was watched. Clarification of doubt, etc. this will be followed for all the documentaries given below.
7	19 th – 23 rd Feb.	<i>Wonders of universe</i> : Gravity
8	26 th Feb – 2 nd Mar.	<i>Wonders of universe</i> : Light
9	5 th -9 th Mar.	<i>Wonders of the universe</i> : sun
10	13 th -16 th Mar	<i>Wonders of universe. Solar system</i>
11	19 th – 23 rd Mar.	<i>Wonders of universe- how earth is unique.</i>
12	9 th – 13 th April	<i>Wonders of universe: outer solar system</i>
13	16 th – 20 th April	<i>Revision and clarifications of doubts.</i>
14	23 rd – 27 th April	<i>Free in order to prepare for exams.</i>

Recommended books.

BERNSTEIN, JEREMY:

Einstein, Fontana modern masters, 1973

BLUNDELL Katherine *Black holes*, oxford university press, 2015.

COLES, PETER. *A very short introduction to cosmology*, oxford university press, 2013.

CLOSE FRANK *particle physics*, oxford university press, 2012.

GIRIFALCO A LUIS, *Universal force*, Oxford University press 2008

GRIBBON John *galaxies*, Oxford University press, 2008.

HAWLEY JOHN F. & K. A. HOLCOMB. *Foundations of Modern Cosmology*, Oxford University press 2005

NEWTON SMITH W.H. *A companion to the philosophy of science*. Blackwell publishers, 2001

ROOS, MATTS. *Introduction to Cosmology*, John Wiley & Sons, Ltd, Sussex, 2003

SAGAN, CARL. *Cosmos*, Ballantine books 2013.

TIMOTHY Clifton, *Gravity*, oxford University press, 2017