PHY660: Gravitation and Cosmology

The purpose of this course is to develop a technical working knowledge about the basics of General Relativity and Cosmology.

The broad topics to be covered are :

1) General Relativity – equivalence principle, basics of tensor calculus, physics of geodesics. [5 Lectures].

2) Covariant derivatives and parallel transport. [3 Lectures].

3) The energy momentum tensor and its properties. The Riemann curvature tensor. [5 Lectures].

4) Lie derivatives, Killing vectors and symmetries. [5 Lectures]

5) Curvature of space-time and the Einstein's equations. The action principle. The Schwarzschild solution. [6 Lectures]

6) Charged and rotating black holes. [5 Lectures]

7) Basics of Cosmology and the cosmological principle. [4 Lectures]

8) The physics of Robertson-Walker metrics. [7 Lectures]

The main references are :
1) Sean Carroll – Lecture notes on General Relativity.
2) Matthias Blau – Lecture notes on General Relativity.
3) Robert Wald – General Relativity.