

Video segments marked a star*

This course is structured in a way that allows for some flexibility in students' backgrounds and objectives. Those students interested in obtaining detailed knowledge of relativity and cosmology can do so by studying all the chapters and videos, while those only interested in the basics can skip those details in the video segments marked by a star *.

3a*	In this section one learns about Lorentz transformation of fields; one can omit the details of such field transformation (Box 2.2).
4b*	In this section one learns of the application of 4-momentum conservation; derivation of Compton scattering angle formula can be omitted.
9a*	Here one learns how the vacuum can acquire a position-dependent <i>index of refraction</i> in the presence of gravity; the calculation details of the deflection angle of light can be omitted.
11c*	One understands the <i>geodesic curve</i> as the line of extremum length, but can omit the details of this calculus of variation calculation.
12a*	While one should understand the meaning of the <i>Newtonian limit</i> but can omit the detailed steps of showing how Newton's equation of motion follows from GR's EOM, the geodesic equation.
12c*	Should know the example of pseudosphere, not details of more general 3D spaces with constant curvature
14a*	Should understand the general spherically symmetric metric form, and the <i>outline</i> how Schwarzschild solution to Einstein equation can be derived.
15b*	Understand the general steps (not all the details) of obtaining the orbit of a mass object in Schwarzschild spacetime, similarly for a massless particle (photon) as outlined in 15c*.
17a*	Know the steps (not the details) of deriving the Riemann curvature tensor
17c*	Can skip the discussion of action principle derivation of the Einstein Eq.
18c*	General idea but skips the details of BH binding energy.
19b*	General idea but skips the details of BH & thermodynamics.
23c*	General idea but skips the details of the study of the time evolution of model universes.
25c*	General idea but skips the details of the study of big bang nucleosynthesis.
26c*	Can skip over cosmic neutrino background
27a*	General idea but skips the details of the study of CMB anisotropy, including 27b* and 27c*
29b*	General idea but skips the details about extracting energy comp from SNe; same for 29c*
30*	General idea but skips the details about the "cosmological constant problem".