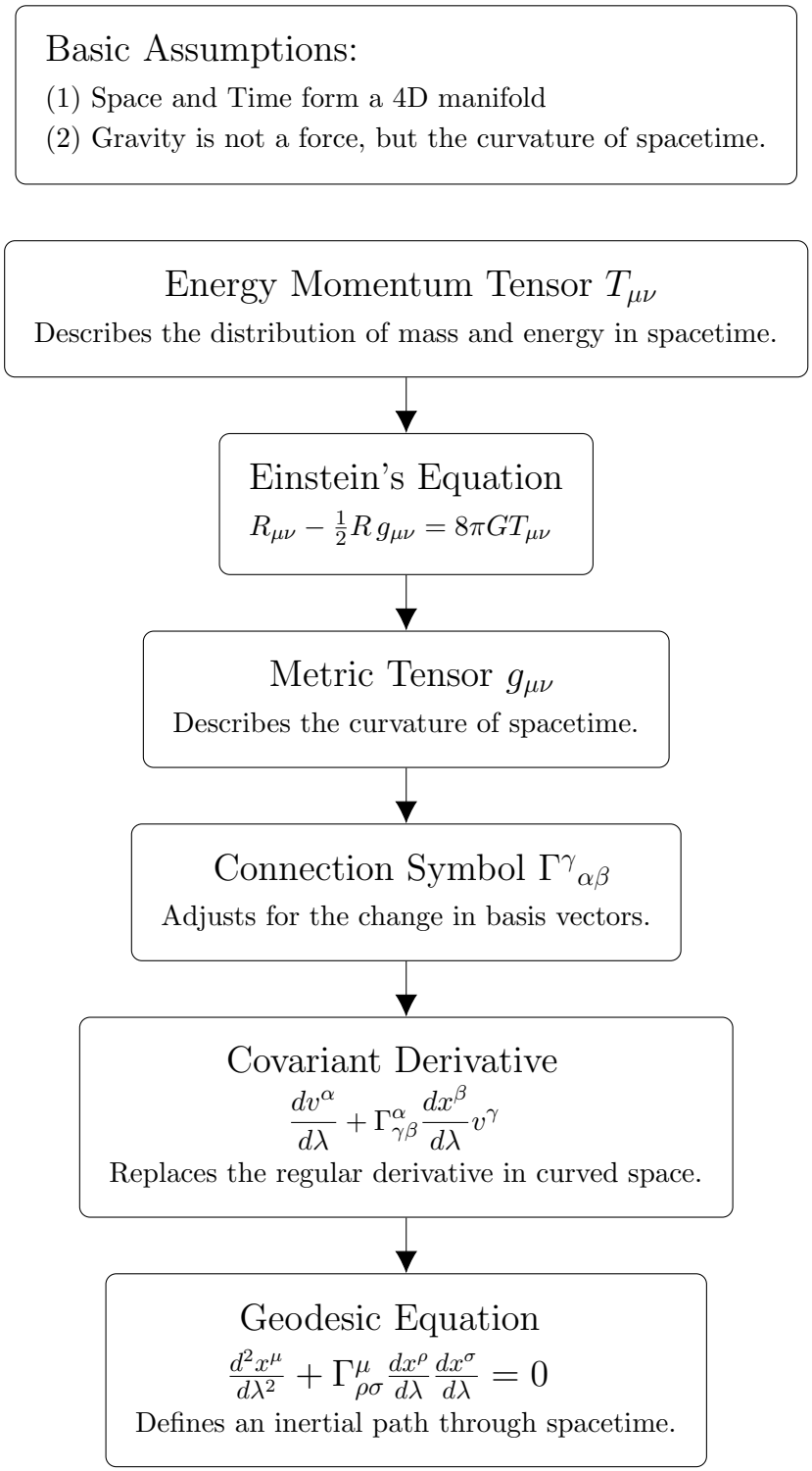
Basic Assumptions:
(1) Space and Time form a 4D manifold
(2) Gravity is not a force, but the curvature of spacetime.
Energy Momentum Tensor $T_{\mu\nu}$
Describes the distribution of mass and energy in spacetime.
Einstein's Equation
$R_{\mu\nu} - \frac{1}{2}R\,g_{\mu\nu} = 8\pi G T_{\mu\nu}$
Metric Tensor $g_{\mu\nu}$
Describes the curvature of spacetime.
Connection Symbol $\Gamma^{\gamma}{}_{\alpha\beta}$
Adjusts for the change in basis vectors.
Covariant Derivative
$\frac{dv^{\alpha}}{d\lambda} + \Gamma^{\alpha}_{\gamma\beta}\frac{dx^{\beta}}{d\lambda}v^{\gamma}$
Replaces the regular derivative in curved space.
Geodesic Equation
$\frac{d^2x^{\mu}}{d\lambda^2} + \Gamma^{\mu}_{\rho\sigma}\frac{dx^{\rho}}{d\lambda}\frac{dx^{\sigma}}{d\lambda} = 0$
Defines an inertial path through spacetime.