

Course Outline

Ph236 ab, Fall & Winter, 2008-09

- ▼ □ Ph 236a, Fall 2008
 - □ Overview (1)
 - ▼ □ Special Relativity & Tensor Analysis in Flat Space-Time (4)
 - □ Fundamental concepts
 - □ Differential Geometry in Flat Space-time
 - □ Laws of physics in frame-invariant forms
 - □ Differential Geometry
 - □ Laws of physics in component form
 - □ Integration/Conservation Laws
 - □ Uniformly accelerated observers
 - ▼ □ Fundamentals of General Relativity (4)
 - □ Differential Geometry in Curved Spacetimes
 - □ Geodesic Equation, Local Lorentz Frames
 - □ Tidal Gravity, Geodesic Deviation and Space-Time Curvature
 - □ Laws of Physics in Curved Spacetime
 - □ Einstein Field Equations
 - □ Stars in General Relativity
 - □ Symmetry and Conserved Quantities
 - □ Local Lorentz Frames and Proper reference frames
 - □ Physical Measurements
 - ▼ □ Nonrotating Black Holes and Wormholes (2)
 - □ Schwarzschild solution & Birkhoff's Theorem
 - □ Reissner-Nordstrom solution
 - ▼ □ Rotating Black Holes (2)
 - □ Kerr solution
 - □ Energy extraction
 - □ Geodesic around rotating black holes
 - ▼ □ Cosmology (2)
 - □ Friedman-Walker spacetime
 - ▼ □ Weak Gravitational Fields (2)
 - □ Newtonian Limit
 - □ Linearized theory
 - □ Multipolar expansion
 - □ Propagation of Gravitational Waves in curved spacetime (1)
 - □ General relativity as Nonlinear Field Theory in Flat Spacetime (1)
- ▼ □ Ph 236b, Winter 2009
 - □ Gravitational Wave Detectors (2)
 - □ Astrophysics of Gravitational-Wave Sources (2)
 - □ Compact Binary Systems (2)
 - □ Black Hole Perturbation & Applications (3)
 - □ Stochastic GW background, cosmic strings, etc. (1)
 - □ Causal structure of space-time, physics of black-hole horizons (5)
 - □ Generic Singularities (1)
 - □ General relativity in higher dimensions (2)
 - □ Introduction to Numerical Relativity (2)