1   Maxwell equations and Galileo invariance.

2   Radar definition of simultaneity, the origin of the Lorentz group.

3   The Minkowski metric, the inverse Cauchy-Schwarz inequality, examples of Lorentz transformations.

4   Lorentz contraction, time dilation, the twin paradox.

5   Addition of velocities, Fizeau's experiment, apparent superluminal motions.

6   Proper time, uniform acceleration, photons in special relativity.

7   Doppler effect, aberration of light.

8   Decay of particles, Compton effect.

9   Inelastic and elastic collisions.

10   Maxwell tensor, Maxwell equations and their invariance.

11   Vector potential, gauge invariance, Lorenz gauge.

12   Lorentz equations of motion; Maxwell Energy-Momentum tensor and its properties.

13   Galileo, Lorentz, and Einstein's relativity principles. The equivalence principles.

14   Introduction to tensor calculus: scalars, vectors, covectors, tensor products, contractions.

15   Covariant derivatives and their properties.

16   The Levi-Civita covariant derivative, local inertial coordinates.

17   The curvature tensor and its properties.

18   Introduction to general relativistic physics.