Key topics in the course of Relativity Theory

1. Tidal forces (Newton's law of gravitation) and time-space curvature.
2. Equivalence principle, gravitational acceleration, certain inertial system and physical significance of Christoffel symbols.
3. Rotating reference frame.
4. Uniformly accelerated reference frame.
5. The metric tensor, the line element. Physical meaning of ds^2 for time-like interval.
6. Parallel transport and geodetic curves.
7. Covariant Lagrange dynamics. Application for the motion of free particles, such as vertical throw in a uniformly accelerated reference frame.
8. Calculation of the components of the Einstein curvature tensor using the Cartans equations.
9. Gravitational frequency shift and time dilation.
10. Particle dynamics in the Schwarzschild time-space with application to Mercury perihelion precession or light deflection.
11. Tolman–Oppenheimer–Volkoff equation.
12. View, as a consequence of Einstein's field equations that free particles move along geodetic curves.
13. Robertson-Walker line element. Cosmic red shift.
14. How the density of different types of fluid evolves depending on the scale factor in an expanding universe.
15. Repulsive gravity and increasing cosmic expansion rate.
16. The simplest types of relativistic universe models.