Possible presentation topics

- Cavendish experiment/methods to measure G, g.
- sizes in the solar system, relations with Kepler's 3rd law.
- Bertrand's theorem.
- time along Kepler orbits: Kepler equation/Lambert's theorem.
- orbital determination methods in astronomy: Lambert's 'comet' theorem, Gauss method, Laplace method.
- potential theory and harmonic functions: expansions for potentials of asymmetric mass distributions.
- elliptic functions: explicit solution to the pendulum.
- the figure-8 orbit, choreographies in N-body problems.
- geodesics on surfaces of revolution.
- geodesics of left-invariant metrics on Lie groups, analogues with fluid dynamics.
- examples of symplectic reduction.
- Hidden symmetries in the Kepler problem, Runge-Lenz vector, regularization of collisions in the Kepler problem.
- the solar system as a perturbed integrable system, secular dynamics.
- wave equation, interference in geometric optics (physical optics).