Physics as introduction:

The main theory of physics is The Theory of Everything which does not exist yet but there are many significant steps to complete this theory. The greatest achievements in that direction so far are The Standard Model of Physics, discovery of Higgs boson, and The Large Hardron Collider.

The main physicists are Newton, Bernoulli, Maxwell, Tesla, Schrodinger, Dirac, Hawking, etc. We study some their works in-depth.

Laws of physics:

The laws of physics usually have mathematical representation: the laws of Newton, heat equation, diffusion equation, Maxwell’s equations, Schrodinger’s equations, Dirac’s equations, Einstein’s equations, etc.

Reference frames:

Inertial reference frame:

Galileo principle says that in all inertial reference frames the equations of mechanical motion are the same. Indeed, the inertial frame rests or moves with the same velocity, thus, differentiation of a constant velocity gives zero and the differential equations and up being the same.

However, this principle does not work in electrodynamics for the velocities close to the speed of light. Thus, Lorentz transformation is used in electrodynamics and not the transformation of Galileo.

Non-inertial reference frames move with acceleration or deceleration, or rotation, which essentially means that a non-inertial reference frame moves with acceleration (either positive or negative acceleration for translation, or change of direction of velocity occurs).

Quantum computing:

Quantum computing is probably one of the most important areas of physics which can improve our lives a lot.

Controlled nuclear synthesis:

Controlled nuclear synthesis may help us to solve the energy crisis in the world.