We previously discussed the concept of conservation of momentum.

We will soon see that there is another very powerful conservation principle in physics called the conservation of energy.

It states that there is a certain quantity called energy that remains unchanged in the system except for any that flows in or out of the system.

It's hard to say exactly what energy is.

It's an abstract quantity that we count up in a certain way.

When calculating the energy of a system, we must keep careful track of any energy that enters or leaves the system.

There are also a number of different forms of energy-- kinetic energy, gravitational energy, elastic energy, electrical energy, heat energy, and others.

Each of these has its own formula for calculation.

If you sum all these energies up for a system, the total will remain unchanged except for what goes in and comes out.

It turns out that using energy rather than force, one can construct a complete system of mechanics that is fully equivalent to the Newtonian system.

This was done by Lagrange and Hamilton.

And you may encounter their system in the future, if you take more advanced courses in physics.

However, even in the Newtonian system, energy remains a useful concept.

This week, we will discuss kinetic energy, the energy associated with the motion of a mass, and also the concept of work, which allows us to calculate how the action of a force changes the kinetic energy.

We will see that the work done by a force is calculated by evaluating an integral that in general depends upon the specific trajectory or path taken by the object or system.

However, we will also see that there [? is ?] a special class of forces called conservative forces for which the work integral is path independent and instead depends only on the starting and ending points.

Finally, we will discuss examples of both conservative and non-conservative forces.