Last week, we discussed the kinematics of motion.

How one describes the motion of an object by specifying its position, velocity, and acceleration as a function of time.

This week, we will continue by discussing the dynamics of motion.

How the application of forces on an object changes the geometry or trajectory of its motion.

We will see that the applied forces and the change in trajectory are related through Newton's laws of motion.

We will begin by reviewing Newton's three laws of motion.

These were a landmark achievement in scientific thought.

Most people who haven't studied physics tend to intuitively think in terms of the ancient mechanics of Aristotle in which an applied force is required to maintain a body in uniform motion.

Superficially, this seems to agree with our everyday experience, but only because friction plays such an important role in our everyday life.

One of Newton's great insights was that applied forces cause changes in an object's motion, rather than being necessary to maintain uniform motion.

Newton's laws were the end result of a great deal of careful definition, observation, and reasoning by many scientists up to and including Newton.

It is a fascinating and compelling chapter in the history of science, but we will not discuss that history in this course.

Instead, we will simply state Newton's three laws of motion as assumed postulates or axioms and discuss their meaning and application.

Finally, we will consider several specific examples of physical forces, such as gravity, contact forces exerted by a solid surface, like the so-called normal force, which acts perpendicular or normal to the surface, and friction, which acts parallel to the surface, pulling forces like tension in a rope or chain, and the force exerted by a stretched or compressed spring described by Hooke's law.

Taken as a whole, this week will show us how to connect the two sides of Newton's Second Law of Motion, f equals ma, the dynamics or application of forces on the left-hand side and its relation to the kinematics, the

change in geometry of the object's motion or trajectory, on the right-hand side.