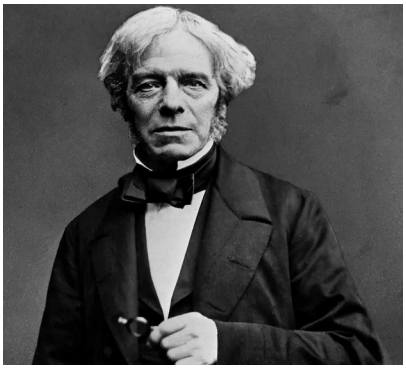
Living in the Past

Historical perspective

The student becomes the master



Having grown up near South London in relative poverty, Michael Faraday had very little formal education. At age 14, he became apprenticed to a local bookkeeper, and began studying many of the books he was asked to bind, gradually educating himself with philosophy and science.

In 1812 at the age of 20, Michael's apprenticeship neared the end, and he started attending lectures by the eminent English chemist Humphry Davy, perhaps one of the most famous scientists in the world at the time. Eventually, Michael sent Davy a 300-page book based on notes he had taken during these lectures, and immediately Davy was impressed. The next year, when Professor Davy damaged his eyesight in an accident, he invited Michael to be employed as his lab assistant, which Michael eagerly accepted.

Subsequently, Professor Davy took Michael on an 18-month tour of Europe to assist him. During that time, Faraday was able to meet other scientists such as Andre-Marie Ampere in Paris and Alessandro Volta In Milan. Once back in London, the Royal Institution increased Michael's salary, and Professor Davy began acknowledging him in his academic papers. By age 24, Michael had given his first lecture and published his first academic paper on matter, and at age 32, the Royal Society began to recognize Faraday as a notable scientist in his own right.

In 1831, Michael began a series of experiments on electromagnetism, in an attempt to take the discoveries of Hans Christian Oersted further. His breakthrough came when he wrapped two insulated coils of wire around an iron ring, and found that, upon passing a current through one coil, a momentary current was induced in the other coil, creating the first transformer through a phenomenon known as *mutual inductance*.

He also found that he could cause a current to flow in a wire when he moved a magnet through a loop of that wire, or moved the loop over a stationary magnet. These formed the foundation for the first electrical generator. Faraday's demonstrations established that ***a changing magnetic field will produce an electric field***, a relationship that was modeled by James Clerk Maxwell as *Faraday's Law*, and became one of Maxwell's Equations. Faraday devised his *lines of flux*, to visually illustrate the behavior of the electromagnetic fields.

Among Faraday's other achievements, he invented the electric motor, the Bunsen burner, popularized terms such as *anode*, *cathode*, *electrode*, and *ion*, and established that magnetism can affect rays of light. Near the end of his career, Faraday proposed that electromagnetic forces extended into the empty space around the conductor (think antenna). This idea was rejected by his fellow scientists, and Faraday did not live to see the eventual scientific community acceptance of his proposition.

Physicist Ernest Rutherford later stated, *When we consider the magnitude and extent of his discoveries and their influence on the progress of science and of industry, there is no honour too great to pay to the memory of Faraday, one of the greatest scientific discoverers of all time.*

The SI derived unit for ***capacitance*** (the **Farad**, symbol "F") was named in Michael's honor. You can read more about his life and achievement history on the Famous Scientists website.