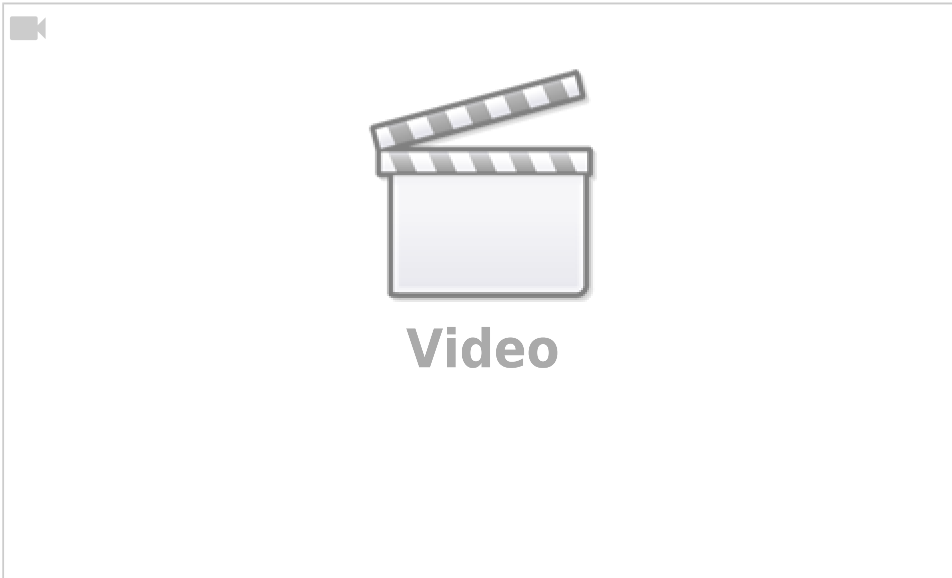
Conceptual Electronics Videos

I just found a series of videos that animate various physics concepts. The first one I found was on the concept of impedance:



But this was #15 in a series of 24 videos. I just finished watching the first few and they basically managed to start from scratch and work their way up to Electro-Magnetism pretty much without math. One thing they could have improved though is the labelling. So while you watch these, keep in mind that:

- Red particles are positive charges
- Blue particles are negative charges
- Purple arrows are electric fields
- Green arrows are magnetic fields.

Also, this first video can seem pretty overwhelming, with all these fields creating each other, but there's really only four rules that govern it all:

Name	**Math**	**Description**
Gauss' Law	$$\vec{\nabla} \cdot \vec{E} = \frac{\rho}{\varepsilon_0}$$	An electric charge (right) creates an electric field that points away from the charge and “disperses” to infinity (left)
Gauss' Law of Magnetism	$$\vec{\nabla} \cdot \vec{B} = 0$$	A magnetic field (left) can not “disperse” to infinity the way an electric field can. In other words: “magnetic charges” don't exist the way electric charges do.
Faraday's Law of Induction	$$\vec{\nabla} \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$$	A changing magnetic field (right) creates a “curly” electric field (left) and vice-versa.
Ampere's Law	$$\vec{\nabla} \times \vec{B} = \mu_0 \Big(\vec{J} + \varepsilon_0 \frac{\partial \vec{E}}{\partial t} \Big)$$	An electric current and/or a changing electric field (right) creates a “curly” magnetic field (left)

Together, these four equations (known as Maxwell's Equations) account for all the electromagnetic phenomena we observe: