

21.01

What is Physics?

- **Physics** = the study of physical phenomenon and the mechanisms that cause them
 - This class is focused on **electromagnetism**
- Physics first discovered by the Greek philosophers
 - Rub piece of amber and it “pulls” straw near it
- **Hans Christian Oersted** = physicist who discovered the *unity* of electricity and magnetism (~1820)
 - Prior to this, the two phenomenon were assumed to be independent of one another
- **Michael Faraday** = physicist that pioneered much of the properties of electromagnetism
 - Didn’t break these laws down into concrete formulas
 - * Physicists *love* them some formulas
- **James Clerk Maxwell** = physicist who made Faraday’s discoveries more concrete
 - Created **Maxwell’s Equations**
 - * **Gauss’s Law**

$$\nabla \cdot \mathbf{E} = \frac{\rho}{\epsilon_0}$$

- * **Gauss’s Law for Magnetism**

$$\nabla \cdot \mathbf{B} = 0$$

- * **Faraday’s Law of Induction**

$$\nabla \times \mathbf{E} = -\frac{\delta \mathbf{B}}{\delta t}$$

- * **Ampere’s Circuital Law**

$$\nabla \times \mathbf{B} = \mu_0 \left(\mathbf{J} + \epsilon_0 \frac{\delta \mathbf{E}}{\delta t} \right)$$