

**PHYSICS 230: GENERAL PHYSICS II**  
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**Topics on Review #2**

- **Magnetic force on moving charge and current**
- **Torque on a current loop and electric motors**
- **Magnetic fields due to current flow (Biot-Savart and Ampere's laws)**
- **Induced voltage and current (Faraday's and Lenz's laws) and electric generators**
- **Transformers and inductance**
- **AC Circuits: phase relationships and impedance**
- **Generation / detection of electromagnetic waves**
- **Electromagnetic wave equations, speed, energy, and intensity**
- **Huygen's principle, reflection / refraction, total internal reflection**
- **Mirror / Lens equation: principle rays, similar triangles**
- **Image formation and optical devices**

**Equations that will be provided on Review #2**

$\vec{F}_B = q\vec{v} \times \vec{B}$	$\vec{F}_B = Id\vec{s} \times \vec{B}$	
$\mu_0 = 4\pi \times 10^{-7} T \cdot m / A$	$d\vec{B} = \frac{\mu_0}{4\pi} \frac{Id\vec{s} \times \hat{r}}{r^2}$	$\oint \vec{B} \cdot d\vec{s} = \mu_0 I_{thru}$
$B = \frac{\mu_0 I}{2\pi r} \quad B = \frac{\mu_0 I}{2a}$	$B = \mu_0 \frac{N}{L} I$	$u_B = \frac{B^2}{2\mu_0}$
$\varepsilon_{ind} = -N \frac{d\Phi_B}{dt}$	$\oint \vec{E} \cdot d\vec{s} = -\frac{d\Phi_B}{dt}$	$\varepsilon_L = -L \frac{dI}{dt}$
$V_{rms} = \frac{V_{max}}{\sqrt{2}}$	$\omega_0 = 1/\sqrt{LC}$	$Z = \sqrt{R^2 + (X_L - X_C)^2}$
$X_L = \omega L$	$X_C = 1/\omega C$	$\cos \varphi = R/Z$
$\frac{\partial^2 E}{\partial x^2} = \mu_0 \varepsilon_0 \frac{\partial^2 E}{\partial t^2}$	$c = 1/\sqrt{\mu_0 \varepsilon_0} = E/B = 3 \times 10^8 m/s$	$\varepsilon_0 = 9 \times 10^{-12} C^2 / N \cdot m^2$
$E = E_{max} \cos(kx - \omega t)$	$I = \frac{1}{2} c \varepsilon_0 E_{max}^2$	$v = \lambda f = c/n$
$n_1 \sin \theta_1 = n_2 \sin \theta_2$	$\frac{1}{p} + \frac{1}{q} = \frac{1}{f}$	$M = \frac{h_i}{h_o} = -\frac{q}{p}$