**HUNTER COLLEGE OF CUNY**
**Department of Physics**
**Physics 121**

Spring 2017

**General Physics: Introduction to Electricity & Magnetism, Light, and Atomic Physics**

**Lecturer: Professor Godfrey Gumbs**
**Office: 1247N;** **Phone #: 650-3935**

**Text**: The course will follow Halliday, Resnick, and Walker, *Fundamentals of Physics* Volume 2, Tenth Edition, John Wiley)

College rule Re. academic dishonesty: Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The college is committed to enforcing the CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures.
Lectures: 121 LC - Tuesday and Thursday: 5:30-7:30

Recitations: 121RC - Thursday: 8:30-9:30

First Mid-Term Exam: Thursday, March 16 in 1311HN

Second Mid-Term Exam: Thursday, April 27 in 1311HN

End-Term Exam (*Cumulative*): Time and date to be announced. However, note that the week of finals is Tuesday December 15 through Wednesday December 23.

**NOTE**:

- First day of classes: Tuesday January 31, 2017.
- No classes: Monday April 10 - Tuesday April 18: Spring Recess.
- Thursday April 20: Classes follow a Monday schedule.
- Last class: Thursday May 18.
- There will be NO make-up exams.

## Tentative Outline

1. Electricity: Chapters 21-25.
2. Magnetism: Chapters 26-30.
3. Geometrical Optics: Chapters 31-33.
4. Special Relativity: Chapter 39 (Maybe).

There will be a total of **twenty-eight** lectures. thirteen chapters will be covered.

## Grades Computed as Follows

| | |
|---|---|
| First Midterm: | 25% |
| Second Midterm: | 25% |
| Final Exam: | 35% |
| Laboratory: | 15% |
| TOTAL | 100% |

NOTE: In weekly recitations, lecture materials will be reviewed and assigned problems will be solved.

## Some Useful Results/Formulas

$F_{\text{elec}} = \frac{1}{4\pi\varepsilon}\frac{q_1 q_2}{r^2}$; $\frac{1}{4\pi\varepsilon} = 8.99 \times 10^9 \text{N} \cdot m^2/C^2$; $\mathbf{E} = \mathbf{F}/q$; $c = 2.9979 \times 10^8 m/s$;
$\Phi = \oint \mathbf{E} \cdot d\mathbf{A}$ (flux through a Gaussian surface); $\varepsilon\Phi = q$ (Gauss' law); $\mathbf{E} = -\nabla V$;
$q = CV$; $U = \frac{q^2}{2C} = \frac{1}{2}CV^2$; $i = \int \mathbf{J} \cdot d\mathbf{A}$; $\mathbf{J} = (ne)\mathbf{v}_d$; $R = V/i$; $\mathbf{E} = \rho\mathbf{J}$;
$\sigma = \frac{1}{\rho} = ne^2\tau/m$ (Drude's formula); $P = i^2R = \frac{V^2}{R}$ (resistive dissipation);
$R_{\text{eq}} = \sum_{n=1}^{N} R_n$ (N resistors in series); $R_{\text{eq}} = \sum_{n=1}^{N} \frac{1}{R_n}$ (N resistors in parallel);
$\omega = 2\pi\nu$ ($\nu =$ frequency, $\omega =$ angular frequency); $d\mathbf{B} = \left(\frac{\mu_0}{4\pi}\right)\frac{i\ d\mathbf{s}\times\mathbf{r}}{r^3}$ (Biot-Savart law);
$\oint \mathbf{B} \cdot d\mathbf{s} = \mu_0 i$ (Ampere's law); $\oint \mathbf{E} \cdot d\mathbf{s} = -\frac{d\Phi_B}{dt}$ (Faraday's law);
$L = \frac{N\Phi}{i}$ (inductance defined);
$\mathcal{E} = -L\frac{di}{dt}$ (self-induced emf); $u_B = \frac{B^2}{2\mu_0}$ (magnetic energy density);
$\oint \mathbf{B} \cdot d\mathbf{s} = \mu_0\varepsilon_0\frac{d\Phi_E}{dt} + \mu_0 i$ (Ampere-Maxwell law);
$\mathbf{S} = \frac{1}{\mu_0}\mathbf{E} \times \mathbf{B}$ (Poynting vector);
$n_1 \sin\theta_1 = n_2 \sin\theta_2$ (law of refraction);
$\frac{1}{o} + \frac{1}{i} = \frac{1}{f} = (n-1)\left(\frac{1}{r_1} - \frac{1}{r_2}\right)$ (thin lenses);
$\frac{1}{o} + \frac{1}{i} = \frac{1}{f} = \frac{2}{r}$ (spherical mirror)
$\frac{n_1}{o} + \frac{n_2}{i} = \frac{n_2 - n_1}{r}$ (single surface);
$m = -i/o$ (lateral magnification);
$d\sin\theta = m\lambda$ (multiple-slit diffraction);
$2d\sin\theta = m\lambda$ (Bragg's law).