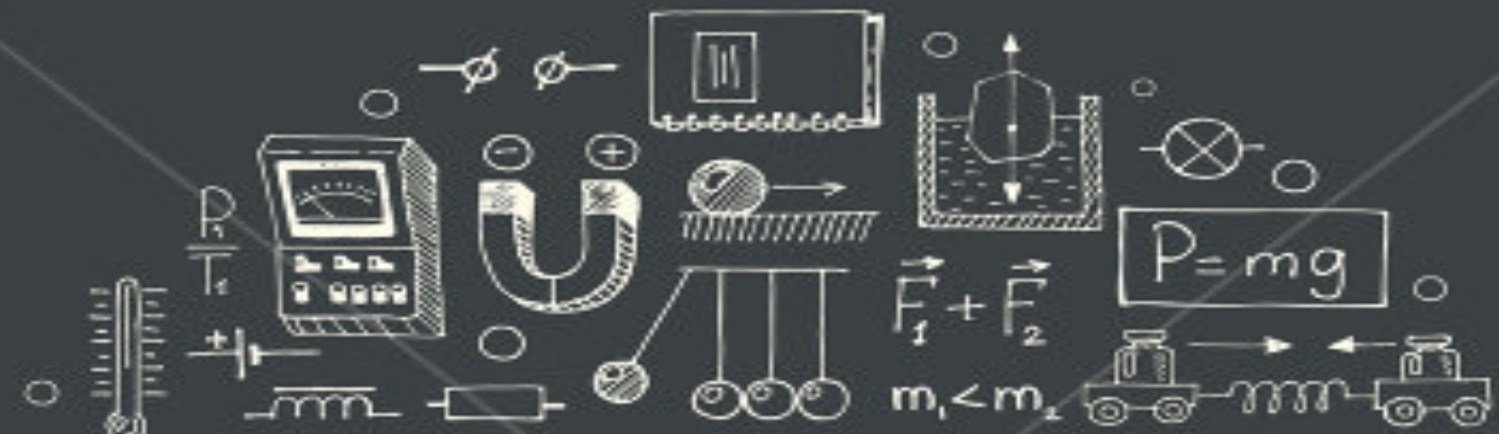


PHYSICS



$$\vec{F}_1 + \vec{F}_2$$
$$m_1 < m_2$$

$$P = mg$$



$$E = mc^2$$

$$\vec{v}_1 = -\vec{v}_2$$

Figuring out your requirements to graduate

$\Sigma F_y = 0 \Rightarrow F_n - mg \cos \theta = 0$
 $|F_n| = mg \cos \theta$
 $\Sigma F_x = \max$
 $MR_n \mu = \frac{mg \sin \theta \cos \theta}{mg \cos \theta \cos \theta} = \tan \theta \cos \theta$
 $F_{R, \max} = -MR_n \mu mg \cos \theta = 0$
 $= -mg \sin \theta \cos \theta$
 $v_e = \sqrt{2gl}$
 $\Psi = 0, d = n \frac{\lambda}{2}, n = 1, 2, 3$
 $E = \frac{1}{2} m v^2 = \frac{p^2}{2m}; E_n = \frac{p_n^2}{2m}$
 $E_1 = \frac{h^2}{8md^2}$
 $E_2 = 4E_1$
 $E_3 = 9E_1$
 $|\epsilon| = \frac{1}{4\pi\epsilon_0} \frac{dq}{r^2}$
 $d\epsilon_x = \frac{2}{4\pi\epsilon_0} \frac{dx}{r^2}$
 $d\epsilon_y = \frac{2}{4\pi\epsilon_0} \frac{y dx}{r^3}$
 $E_n = n^2 \frac{h^2}{8md^2} = n^2 E_1$
 $E_1 = \frac{h^2}{8md^2}$
 $h\nu = |E_e - E_a|$
 $|\psi|^2 = A^2 \exp(-\frac{x^2}{2\sigma^2})$
 $\Psi(x,0) = A \exp(-\frac{x^2}{2\sigma^2}) e^{i\phi}$
 $\beta(\lambda) = \frac{\sqrt{\pi}}{\lambda} e^{-\sigma^2(\lambda - \lambda_0)^2}$
 $\text{Re}(\psi) = A \cos(k_0 x - \omega t)$
 $|E| = \frac{1}{4\pi\epsilon_0} \frac{ze^2}{r^2} = \frac{mv^2}{r}$
 $U_H = -\int \mathbf{J} \cdot \mathbf{B} \cdot d\mathbf{l}$
 $\mathbf{J} = \frac{1}{V} q \mathbf{v} dV$
 $\frac{v}{u} = \frac{1}{A q r b} \int b d\epsilon v d$
 $= -\int \mathbf{J} \cdot d\mathbf{l} U_H$
 $E_{\text{pot}, A} = 0$
 $E_{\text{cin}, A} = 0$
 $F = m_2 \theta + 2F_3$
 $a = \frac{dv}{dt} = \frac{dv}{du} \frac{du}{dt}$
 $= \frac{(m_2 - m_1)g}{(m_1 + m_2)}$
 $v = \sqrt{\frac{2(m_2 - m_1)gh}{(m_1 + m_2)}}$
 $\frac{1}{2} m v_e^2 + m g y_e = \frac{1}{2} m v^2 + m g y_a$
 $\frac{1}{2} m v_e^2 = m g h$
 $\lambda_1 = \frac{u_1}{f}; \lambda_2 = \frac{u_2}{f}$
 $\sin \theta_2 = \frac{r_1}{AB}$
 $\frac{\sin \theta_1}{\sin \theta_2} = \frac{r_2}{r_1} = \frac{u_1}{u_2} = \frac{n_1}{n_2}$
 $\frac{v^2}{1 - (v/c)^2} = (v/c)^2 + [-v/c \sqrt{1 - (v/c)^2}]^2$
 $\frac{1}{\gamma} = \sqrt{1 - (v/c)^2}$
 $p_x^{(A)} = -p_x^{(B)}$
 $F_z = \frac{F_z}{2a}$
 $E = F_z \cdot s$
 $= \frac{F_z}{2a} \cdot u \cdot h$
 $= \frac{F_z}{2a} \cdot h$
 $= m \cdot g \cdot h$
 $s = u \cdot h$
 $\frac{1}{f} = \frac{1}{s} + \frac{1}{s'}$
 $\frac{A'B'}{AB} = \frac{s'}{s}$
 $\frac{A'B}{PO} = \frac{s'}{f}$
 $\frac{s'}{s} = \frac{s' - f}{f}$
 $F_s \tan \theta = \frac{ax}{g}; a = g \tan \theta$
 $F_s = \frac{mg}{\cos \theta}; |F_s| = \frac{mg}{\sin \theta}$
 $v = \frac{\lambda}{T} = v \lambda$
 $\omega = k v$
 $\Sigma F_y = m a_y = F_{Ay} + F_y$
 $F_A = m g \vec{y}$
 $F = -k_2 x y$
 $\Sigma F_y = m \frac{d^2 y}{dt^2}$
 $y' = A \cos(\omega t + \phi)$
 $F_e = F \sin \phi$
 $v = v \sin \phi$
 $v = v_0 + \omega x \text{Add}$
 $U_A, \text{eff} = X_C \text{eff}$
 $U_A, \text{eff} = X_C \text{eff} = \frac{X_C U_e \text{eff}}{\sqrt{R^2 + X_C^2}}$
 $U_A, \text{eff} = X_C \text{eff} = \frac{X_C U_e \text{eff}}{\sqrt{R^2 + X_C^2}}$
 $\Sigma F_y = -k_2(y' + y_0) + m g$
 $\Sigma F_y = -k_2 y'$
 $-k_2 y' = m \frac{d^2 y}{dt^2}$
 $E_{\text{pot}} = -\int k_2 y' dy$
 $m a_0 = \frac{1}{2} k_2 y'^2 + E_{\text{pot}}, 0$
 $\Sigma F_y = -k_2(y' + y_0) + m g$
 $\Sigma F_y = -k_2 y'$
 $-k_2 y' = m \frac{d^2 y}{dt^2}$
 $E_{\text{pot}} = -\int k_2 y' dy$
 $m a_0 = \frac{1}{2} k_2 y'^2 + E_{\text{pot}}, 0$
 $U_A, \text{eff} = X_C \text{eff}$
 $U_A, \text{eff} = X_C \text{eff} = \frac{X_C U_e \text{eff}}{\sqrt{R^2 + X_C^2}}$
 $F_n x + F_a x = m a$
 $F_n x = 0; F_a x = l \cos \theta$
 $= m g \sin \theta$
 $a_x = g \sin \theta$
 $v^2 = 2 g \sin \theta \Delta x; v^2 = 2 g h; v_s = \sqrt{2 g h} \cdot \sin \theta$
 $\oint \mathbf{E} \cdot d\mathbf{l} = -\frac{d}{dt} \int \mathbf{B} \cdot d\mathbf{A} = -\int \frac{d\mathbf{B}}{dt} \cdot d\mathbf{A}$
 $\nabla \cdot \mathbf{B} = 0$
 $\oint \mathbf{B} \cdot d\mathbf{l} = \mu_0 \int \mathbf{J} \cdot d\mathbf{A} = \mu_0 \int \mathbf{J}_e \cdot d\mathbf{A}$
 $\oint \mathbf{E}_e \cdot d\mathbf{A} = \frac{1}{\epsilon_0} q_i$
 $\oint \mathbf{A} \cdot d\mathbf{A} = 0$
 $\delta = \beta_2 + \mu_0 M = \beta_2 (1 + \chi_m)$
 $E = c B$
 $m_1 v_1 + m_2 v_2$
 $= m_1 v_{1e} + m_2 v_{2e}$
 $\frac{1}{2} m_1 v_{1e}^2 + \frac{1}{2} m_2 v_{2e}^2$
 $= \frac{1}{2} m_1 v_{1A}^2 + \frac{1}{2} m_2 v_{2A}^2$
 $m \cdot a$
 $F_s \tan \theta = \frac{ax}{g}; a = g \tan \theta$
 $F_s = \frac{mg}{\cos \theta}; |F_s| = \frac{mg}{\sin \theta}$
 $v_e = \sqrt{\frac{2 \Gamma m e}{r \epsilon}} = \sqrt{2 g r e}$
 $E_2 > 9$
 $E_{\text{pot}}(r) = -\int \frac{dE}{dr} dr$
 $E_{\text{lin}} = E - E_{\text{pot}}$

About our Physics majors

(there are 4!)

In the College of Engineering:

- *Engineering Physics* is our core physics curriculum for students at the University of Illinois at Urbana-Champaign. It is a rigorous program in fundamental Physics. In addition to courses in theoretical physics, this program offers advanced laboratory courses supported by the College of Engineering surcharge funds. It is also very flexible, allowing electives that can be used to create custom programs combining Physics with other disciplines and training in technical areas. Students interested in attending graduate school in Physics or other STEM fields, and/or pursuing careers in physics should apply to the College of Engineering for the Engineering Physics degree program.



...& our LAS Physics majors

In the College of Liberal Arts and Sciences:

1. The *Science and Letters Physics* curriculum provides a solid training in physics but also allows space for electives which can be selected to create a physics-based educational program in a wide variety of interdisciplinary fields.
2. The *Specialized Physics* curriculum incorporates our rigorous Science and Letters curriculum, rich in fundamental physics, mathematics, and laboratory technique, with a classical liberal arts education that includes a heavy concentration of physics courses.
3. *LAS Physics Teaching Concentration* is if you plan to pursue a career in teaching physics, your completion of this concentration will fulfill state certification requirements to teach both physics and general science.



Planning Ahead

- Making your 4 year plan
 - Lay out your math courses
 - Lay out your physics courses
 - Lay out your remaining General Education Requirements
 - Consider a Minor, 2nd Major, Study Abroad...
 - Planning to find an internship or research?



Prerequisites!

When planning your courses, always check the course schedule to make sure you have the appropriate Prerequisites.

Prerequisite VS. Credit or Concurrent with...

<https://courses.illinois.edu/>



DARS (Degree Audit Report)

The DARS Shows all requirements required for graduation

General Education Requirements

Major requirements

Major, UIUC, and Transfer GPAs

Total Credit hour requirement

You are responsible for your DARS.

If there is a problem or question, please let me know.

<https://registrar.illinois.edu/academic-records/dars-audit/>



Degree Program Index

(Majors and Minors offered on campus)

<http://catalog.illinois.edu/degree-programs/>

Minors = approx. 20 credit hours

Double Major = 2 Majors within the same college. Only allowed for students in Science and Letters Physics ONLY. 120 credit hours

Dual Degree = 2 majors in 2 different colleges

OR 2 majors within the College of Engineering

OR Specialized Physics and another major within LAS

*30 additional credit hours to graduate!



What Happens Next...

- Mandatory Advising (October)
- Time Tickets will be Issued (October 22nd)
- Registration begins October 29th

<https://registrar.illinois.edu/registration/registration-process/spring-2019-registration-times/>

When your time ticket becomes available,
AND you are not in class...
REGISTER



LAS General Education Requirements

<http://courses.illinois.edu>

- 3 hrs Composition I
- 3 hrs Advanced Composition
- 3 hrs Quantitative Reasoning I
- 3 hrs Quantitative Reasoning II
- 3 hrs Western
- 3 hrs NonWestern
- 3 hrs of U.S. Minority
- 6 hrs Humanities and Arts
- 6 hrs Social and Behavior Sciences
- 6 hrs Natural Science and Technology
- 4th level of a language (for LAS students) / 3rd level of a language for Engineering Physics students



Common Registration Errors and Definitions

- **Class Restriction-** This course or section is restricted to a certain group of students. Check the class schedule to see if the course will open up to everyone on a certain date.
- **Closed Section-** There are no available seats in this section.
- **College Restriction-** This course or section is restricted to students enrolled in a specific college. Check the class schedule to see if the course will open up to everyone on a certain date.
- **Major Restriction-** This course or section is restricted to certain majors. Check the class schedule to see if the course will open up to everyone on a certain date.
- **Link Error: __ Required-** You didn't choose the proper discussion section/lab for the lecture you selected. If you selected lecture AL, look for discussion sections/labs that have an A in the section number (for example, AA or A3). If you selected lecture BL, look for discussion sections/labs that have a B in the section number.
- **PREQ and Test Score-Error-** The course or section is restricted to a certain group of students; this error has nothing to do with prerequisites or test scores.
- **Reserve Closed-** This course or section is restricted to a certain group of students. Check the class schedule to see if the course will open up to everyone on a certain date.



...That is a lot of information...

Questions?

