

Course Mechanics - Hand-Out  
Course Overview - Book Chapter Details

Motivation - How many here excited?

- New frontiers in single molecules
- Move towards "putting it all together"  
↳ thermo, kinetics

Questions to Ponder

Predicting protein structure  
and function  
- Genomics

Chapter 1 -  
Easy reading - DO IT!

Chapters 2 & 3 - Review of Gen Chem

Chapter 2 →

1<sup>ST</sup> Law → You can't win.  
Energy is conserved

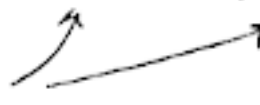
2<sup>ND</sup> Law → You can't break even  
Entropy of the universe increases

3<sup>RD</sup> Law → You can't get out of the game  
Entropy of a pure, perfect, crystal  
at 0K is 0. (ONLY!)

of Energy of universe is constant

(2)

1<sup>ST</sup> Law - Energy of an isolated system is constant

Backup, Define 

System  $\equiv$  where we choose to focus (we define)

Surroundings  $\equiv$  everything else (Universe - System)

Isolated  $\equiv$  no exchange of energy (heat + work) <sup>+ matter</sup>  
between system and surrounding  
(a thermos bottle tries to be this)

Closed  $\equiv$  no exchange of matter (heat, work, OK)  
(Eppendorf tube)

Open  $\equiv$  NOT closed

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Joules (calories, eVgs)  
Energy exchange

~~Hook's Law~~  
extending a spring

1) Work  $\equiv$  classical physics = force  $\times$  displacement

Convention  $\Rightarrow$  For this book, but be careful

$w > 0$  surroundings do work on system

$w < 0$  system does work on surrounding

Hook's Law - extending a spring

$$f = -k(x - x_0) \quad \Rightarrow \quad w = \int f \, dx$$
$$= \int k(x - x_0) \, dx$$

force varies w/ distance  $\uparrow$