



# Physics 121. Thursday, February 21, 2008. • Topics: • Course information • Review of the concept of work and kinetic energy. • Conservation laws: why do we care? • Conservative and non-conservative forces. • Potential energy.

Frank L. H. Wolfs

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### Course information. Homework assignments.

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- Homework set # 4 is due on February 23 at 8.30 am.
- There will be no homework set due on Saturday March 1.
- Homework set # 5 will be available on the WEB on Thursday morning, February 28, at 8.30 am.

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#### Course information. Exam # 1. • On Thursday February 28 between 8 am and 9.30 am the first midterm exam of Physics 121 will be held. The material covered on the exam is the material covered in Chapters 1 - 6 of our text book. • The location of the exam is Hubbell auditorium. • There will be a normal lecture after the exam (at 9.40 am in Hoyt).

- Hoyt).
  A few remarks about the exam:
  You will be provided with an equation sheet with all important equations used in Chapter 1 6.
  If you show up late, you will just have less time to complete the exam.
  If you miss the exam, except for valid well-documented medical reasons, you will receive a score of 0 points. Having your alarm clock die overnight is not considered a valid medical reason.
  Any makeup exam will be a 90-minute oral exam.
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Frank L. H. Wolfs Department of Physics and Astronomy, University of Rochester

## Course information. Exam # 1.

- During workshops on Monday 2/25, Tuesday 2/26, and Wednesday 2/27, the focus will be exam # 1. You can attend any (or all) workshops on these days. Bring your
- questions! There will be no workshops and office hours on Thursday 2/28 and Friday 2/29.
- There will be extra office hours on Wednesday 2/27.
- A Q&A session on the material covered on exam # 1 will take place on Tuesday evening 2/26. Time and place will be announced via email.
- You will receive the exam back during workshop during the week of March 3.
- The TAs will not see the exam until you see it.

Frank L. H. Wolfs

Department of Physics and Astronomy, University of Rochester

## 2

















Conservation of energy	
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• Conservation laws in physics can be expressed in the following manner:	
"Consider a system of particles, completely isolated from outside influence. As the particles move about and interact with each other, there are certain properties of the system that do not change."	
• One of the properties of closed systems that will not change is the total energy of the system. The energy may be converted from one form to another form, but the total will not change. Note: you never waste energy; you just transform it from a useful form to a useless form when you waste it!	

Frank L. H. Wolfs

Department of Physics and Astronomy, University of Rochester





Conservation of energy.  
• Consider what would happen if we define the mechanical energy of a system to be equal to the sum of the kinetic energy *K* and the potential energy *U*:  

$$E = K + U$$
  
• If the total mechanical energy is constant, we must require that  $\Delta E = 0$ , or  
 $\Delta K + \Delta U = 0$ 

• We conclude any change in the kinetic energy  $\Delta K$  must be accompanied by an equal but opposite change in the potential energy  $\Delta U$ . Frank L H. Wolts Department of Physics and Astronomy, University of Rochester



• Per definition, the change in potential energy is related to the work done by the force:

$$\Delta U = -W = -\int_{x_0}^x F(x') dx'$$

• The potential energy at *x* can thus be related to the potential energy at a point *x*<sub>0</sub>:

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$$U(x) = U(x_0) + \Delta U = U(x_0) - \int_{x_0}^{x} F(x') dx'$$

Frank L. H. Wolfs



































Mechanical energy and work.			
• Let's test our underst energy and work by problems:	anding of the concepts of mechanical working on the following concept		
• Q10.1			
• Q10.2			
• Q10.3			
• Q10.4			
• Q10.5			
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