

# Final Review Guide: Physics 100, Spring 2004

The final will be cumulative. Concepts/people/experiments introduced since the midterm are shown in **boldface**.

I've done my best to remember the most important concepts here; if I have omitted something covered in reading or class, you are still responsible for it on the final exam.

You should be familiar with the work of the following scientists whom we have discussed in this class

Pythagoras	Aristotle	Ptolemy
Copernicus	Brahe	Kepler
Galileo	Newton	Franklin
Faraday	Maxwell	Michelson
Einstein	Hubble	
<b>Planck</b>	<b>deBroglie</b>	<b>Thompson</b>
<b>Rutherford</b>	<b>Bohr</b>	<b>Chadwick</b>
<b>Curie</b>	<b>Fermi</b>	<b>Hahn</b>
<b>Meitner</b>	<b>Feynman</b>	<b>Schwinger</b>

You should be able to explain the following experiments/demonstrations that we discussed/performed in class

Full Phase of Venus	Projectile Striking a Falling Can
Falling Objects	Heads or Tails with Many Coins
Speed of Sound	Doppler Shift
Currents Deflecting a Compass	Tesla Coil Lights up Distant Bulb
Speed of Light Measurement	Two-source Light Experiment
Michelson-Morley Experiment	Einstein's "Thought" Experiments
<b>Light emitted by a hot object</b>	<b>Photoelectric Effect</b>
<b>Stern-Gerlach Experiment</b>	<b>Bending of Cathode Rays</b>
<b>Rutherford Scattering</b>	<b>Spectral Lines</b>
<b>Geiger Counter</b>	<b>Radioactive Sources (alpha-rays/gammas-rays)</b>
<b>Bombardment of <math>^{235}\text{U}</math> with Neutrons</b>	<b>Observation of Cosmic Rays in a Cloud Chamber</b>
<b>Discovery of Quarks</b>	<b>Discovery of Antimatter</b>

You should be familiar with the following scientific theories/ideas

Scientific Method	Limitations of Science
Epicycles	Heliocentric (sun-centered) theory of planets
Kepler's Laws	Uncertainty in Measurement
Aristotle's Theory of Motion	
Galileo's Law of Inertia	Galileo's Law of Falling
Galileo's Superposition	Galilean Relativity
Conservation of Momentum Principle	Conservation of Energy
Newton's 2nd Law	Newton's 3rd Law
Newton's Law of Gravity	Conservation of Energy
The 2nd Law of Thermodynamics (Entropy)	Coulomb's Law
Maxwell's Prediction of Electromagnetic Waves	Einstein's Special Relativity
Principle of General Relativity	Curvature of Space-Time
Big Bang Theory	Closed/Open Universes
<b>Planck's Quantization of Light</b>	<b>Wave-Particle Duality</b>
<b>Wave description of Matter</b>	<b>Heisenberg Uncertainty Principle</b>
<b>Stern-Gerlach Experiment</b>	<b>Measurement in Quantum Theory</b>
<b>Plum Pudding Model</b>	<b>Planetary Model of Atoms</b>
<b>Bohr's Atomic Model</b>	<b>Quantum Tunneling</b>
<b>Strong Nuclear Force</b>	<b>Confinement of Quarks</b>
<b>Radioactive (Carbon) Dating</b>	<b>Neutron-Induced Fission</b>
<b>Chain Reactions</b>	<b>Critical Mass</b>
<b>Nuclear Fusion</b>	<b>Quantitative Risk Assessment</b>
<b>Feynman Picture of Quantum Forces</b>	<b>Quark Confinement</b>
<b>Antimatter</b>	
<b>X-rays</b>	<b>Construction of Fission Bombs</b>
<b>Radioactivity's Effects</b>	<b>Dirty Bombs</b>
<b>Breeder Reactor</b>	<b>Uranium Enrichment</b>

You should understand and be able to explain the following terms

Hypothesis	Retrograde Motion	Ellipse
Inertia	Scientific Notation	Uncertainty
Vector	Thermal Energy	Relativity
Friction	Entropy	Wave
Interference	Medium	Electric Charge
Bar Magnet	Compass	Time Dilation
Big Bang Theory	Gravitational Lens	
Inertial Acceleration	Dark Matter and Energy	

### **Brownian Motion**

<b>Quantization</b>	<b>deBroglie Waves</b>	<b>Cathode Rays</b>
<b>Electron</b>	<b>Atomic Nucleus</b>	<b>Energy Levels</b>
<b>Radioactivity</b>	<b>Alpha-Rays</b>	<b>Beta-Rays</b>
<b>Gamma-Rays</b>	<b>Radon</b>	<b>Neutron</b>
<b>Proton</b>	<b>Fusion</b>	<b>Fission</b>
<b>Nuclear Chain Reaction</b>	<b>“Atomic” Bomb</b>	$^{235}\text{U}$
<b>Hiroshima</b>	<b>Nagasaki</b>	<b>Plutonium</b>
<b>Force Carrier</b>	<b>Quark</b>	<b>Photon</b>
<b>Critical Mass</b>	<b>Nuclear Reactor</b>	<b>Breeder Reactor</b>
<b>Gun Ignition</b>	<b>Implosion Ignition</b>	<b>Nuclear Waste</b>

You should understand and be able to explain and calculate relations among the following quantitative measurements. You should also know the units associated with these quantities.

Distance	Direction	Velocity
Speed	Acceleration	Mass
Momentum	Time	Force
Work	Energy	Power
Amplitude	Wavelength	Frequency
Wave Speed	Energy contained in Mass	

**deBroglie Wavelength** **Planck’s Constant** **Half-Life**