

ASTR1010: Astronomy of the Solar System

Test #2 Study Guide

Fall 2019

Lectures: Prof. Emmanouil Georgoulis

Website: <http://www.astro.gsu.edu/~georgmk1/Astro1010-Fall-2019/>

- Please make sure you have an understanding of the material in the Textbook
- Review the Chapter slides available in the course website
- Work on the practice questions, available after each lecture
- Work on the review questions, available after the October 3 practice lecture; notice that a second practice lecture will take place on October 8

The main concepts of each chapter to be examined on October 10 are as follows:

Chapter 4:

- Speed, velocity, acceleration
- Gravity: mass vs. weight
- Momentum & angular momentum: force; torque
- Apparent weightlessness in space: why?
- Newton's laws of motion
- Universality of Newton's laws
- Conservation of momentum, angular momentum and energy
- Energy transfer: can energy be created or lost?
- Temperature and heat
- Strength of gravity: what determines the gravity force?
- How do objects fall in Earth's gravitational field? Does gravitational acceleration depend on a body's mass?
- How do Newton's laws extend Kepler's laws?
- What is the escape velocity?
- How does gravity cause tides? Which planetary bodies exert tides on Earth?

Chapter 5:

- Light and its nature: waves, photons
- The colors of visible light: what do they mean?
- How does light interact with matter?
- Understand emission, reflection, absorption, scattering of light
- The electromagnetic spectrum: is there light beyond visible?
- How do we represent the electromagnetic spectrum?
- Are there colors beyond visible light?
- Wavelength and frequency of light: how are they related – can we obtain the one from the other? (Tip: $c = \lambda \times f \rightarrow$ speed of light = wavelength x frequency)
- The energy of photons (Tip: $E = h \times f \rightarrow$ energy = Planck's constant x frequency)
- Molecules & atoms: what are they?

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- What is the structure of atoms?
- Atomic number, atomic mass number, isotopes
- Phases of matter: what is plasma?
- What is the field that holds atoms together? How is this different than the gravitational field?
- How do atoms interact with light? How is energy stored in atoms and how is it shed away?
- The three basic types of spectra
- What is a chemical fingerprint? How do we 'read' and extract information from spectra?
- Spectra and temperature
- The color of stars: Where does it depend on?
- The Doppler phenomenon: what does it mean in light and sound waves?
- What happens to the spectrum of a rotating object?

Chapter 6:

- How do our eyes and photographic cameras work?
- What is the refraction of light? Examples?
- What are the two important properties of telescopes?
- What are the two main telescope designs? What is their difference?
- Which telescope type is mostly used today? Why?
- What is angular resolution and what is diffraction limit? How can we improve them?
- Why do we get interference in astronomical images?
- What are the three main tasks telescopes are used for?
- How do we decide where to install a science-grade telescope?
- What is the main technology we use to deal with atmospheric turbulence?
- Why do we launch telescopes into space?
- Which wavelengths of the electromagnetic spectrum are not absorbed by Earth's atmosphere?
- Do we have telescopes, both on the ground and in space, that observe invisible (not seen by the human eye) light?
- What is interferometry? How is it achieved?
- Which wavelengths are typically observed by means of interferometry?