

Science-Final Exam Synopsis for Fall Semester 2013

The final exam for the fall semester of science will not include material from the first 6 weeks of the year as that unit had a concluding paper serving as a final exam. The sole focus of the final will be on physics as the subject matter relates to:

In class lecture material

Principles of Physics (Bueche, Jerde, 1995)

The Cartoon Guide to Physics (Gonick and Huffman, 1991)

The Fabric of the Cosmos (Greene, 2005)

The test will have short answers, multiple-choice question and matching questions based on knowledge of the following material,

The material covered on the test will be as follows:

Mechanical Aspects of Physics

1. Motion
 - a. What is motion?
 - b. Determining distance and velocity.
 - c. Velocity v. Acceleration
 - d. Determining velocity
 - e. Force, mass and Acceleration

2. Galileo and Aristotle
 - a. Historical Identification
 - b. Relationship with regard to objects movement

3. Galileo and Newton
 - a. Historical identification
 - b. Properties of Inertia, Force and Acceleration
 - c. Newton's second law

4. Laws of Universal Gravitation
 - a. Inverse square law
 - b. Tides

5. Projectiles and Gravity
 - a. Gravity and a Bullet
 - b. Thought problem: the Monkey and the Hunter
 - c. Satellites and orbits
 - d. Orbits involving more than two objects
 - e. Kepler

6. Newton's third law

- a. The moon and the earth
- b. A book, a table and earth
- c. The Horse and the Cart
- d. A rocket and the earth

7. Forces

- a. With regard to Newton's laws of motion
- b. Vector quantities
- c. Total force and a tug of war
- d. Friction-Static and Kinetic
- e. Air Friction and a Parachute
- f. Fictitious forces

8. Four basic forces

9. Momentum and Impulse

- a. Newton and Force
- b. Momentum
- c. Impulse
- d. Conservation of Momentum

10. Energy

- a. Work
- b. Kinetic and Potential Energy
- c. Conservation of Energy
- d. Conversion of Energy
- e. Thermodynamics

11. Collisions

- a. Elasticity
- b. Vector Sums

12. Rotation

- a. Rotational Inertia
- b. Torque
- c. Angular Momentum
- d. Torque, Angular Momentum and Newton's 2nd Law

The Fabric of the Cosmos

Roads to Reality

1. Provide a synopsis explaining and differentiating the following types of reality.
 - a. Classical
 - b. Relativistic
 - c. Quantum
 - d. Cosmological
 - e. Unified
 - f. Past and Future

2. Historical Figures: Both in terms of historical bio and the theory
 - a. Galileo
 - b. Descartes
 - c. Newton
 - d. Maxwell
 - e. Kelvin
 - f. Einstein
 - g. Eddington
 - h. Bohr
 - i. Feynman

3. The Universe in a Bucket
 - a. Relativity before Einstein
 1. What was the bucket experiment
 2. What implication did it have and what problem did this create?
 3. What was Newton's solution?
 4. What does relativity mean?
 5. Explain Newton's solution in terms of everyday experience
 6. What was wrong with Newton's solution

 - b. Space Jam
 1. What did Einstein mean about comparing the word space to other words?
 2. Leibniz on space
 3. Newton changes the argument

- c. Mach and the Meaning of Space
 - 1. Vantage points
 - 2. Ernst Mach
 - 3. Mach in deep space

- d. Mach motion and the stars
 - 1. Sensation in an empty universe
 - 2. Acceleration v. Movement

- e. Mach v. Newton
 - 1. Mach's incomplete theory
 - 2. Reason's for inspiration
 - 3. Relativity and the Absolute