

**Class meets:** Fridays 11:00 – 12:10 in ISB 231

**Instructor:** Joel Primack– office hours: Wed 2:00-3:00 pm or by appointment  
Office: ISB 318, phone: 459-2580, email: [joel@physics.ucsc.edu](mailto:joel@physics.ucsc.edu)

**Website:** <http://physics.ucsc.edu/~joel/Phys5I>

**Books:** In addition to the textbook for the Physics 5A course, Giancoli's *Physics for Scientists and Engineers*, 4th edition, many chapters of Volume 1 of *The Feynman Lectures on Physics* are relevant for Physics 5I. All three volumes of *The Feynman Lectures*, on reserve in the Science Library, present topics in introductory physics from an advanced viewpoint. In addition, I will use material from Primack and Abrams, *The View from the Center of the Universe* (Penguin/Riverhead, 2006) and Abrams and Primack, *The New Universe and the Human Future* (Yale University Press, 2011).

**Brief Course Description:** Weekly 70-minute 2 unit course covering advanced aspects of classical mechanics and related aspects of modern physics. Concurrent enrollment in course 5A is required. Grades will be based on ~5 homework assignments, a midterm exam on November 18, and class participation. Physics 5I will include some history of physics of Galileo and Newton and their successors, try to develop a deeper understanding of classical physics, and introduce some relevant aspects of relativity and other modern physics. The goal is to help students understand some of the most interesting and challenging aspects of physics, and have fun doing so.

**Topics to be covered will include many of the following:**

History of physics, and of the mathematics and technology that made it possible.

Philosophy of science, and especially of mechanics.

The significance of the concepts of mass and force.

The deep origin and significance of energy, momentum, and angular momentum conservation.

Tricky mechanics problems and how to solve them.

Special relativity, important for motion with high velocity, with applications to particles emitted by radioactive materials and to cosmic rays.

Galaxies and cosmology, including the role of dark matter.

General relativity, our modern theory of space, time, and gravity, including black holes.