

## **8.001**

Physics: From Newton to Relativity, Black Holes, Inflation, the Universe and Beyond  
Sat 1:30-3:00 PM

### **Teachers**

Kylee Carden, MIT 2023, Course 8 (Physics)  
Westley Wenbo Wu, MIT 2023, Course 5-7 (Chemistry and Biology)

### **Syllabus**

This class will introduce the fundamentals of physics and use these basic concepts to understand complicated, buzz-word topics in physics like black holes and the expansion of the universe. This class is designed to be fun and intuitive, and we will dive deep to see beauty in physics! While this class will include mathematical derivations, the main goal of the class is to build physical intuition and introduce students to concepts they will see in future physics courses.

Saturday, July 11: Class Introduction, What is Physics, Limits, Differential Calculus, Integral Calculus, Scalars and Vectors

Saturday, July 18: Key Quantities, Newton's Laws, Forces, Conservation Laws, Kepler's Laws, "Ticket to Mars" Problem

Saturday, July 25: Realms of Physics, Light, Spacetime, Einstein, Gamma, Time Dilation, Length Contraction, Lorentz Transformation

Saturday, August 1: Escape Velocity, Schwarzschild Radius, Black Holes, Quasars, CERN, Inside a Black Hole, "Falling into a Black Hole" Problem

Saturday, August 8: History of the Universe, Big Bang Theory, Properties of the Universe, Antimatter/Dark Energy/Dark Matter, Inflation

Saturday, August 15: Friedmann Equation, End of the Universe, Multiverses, Inspiration, Q&A Session, "Deriving the Friedmann Equation" Problem