

S15641: Relativity Crash Course

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Zoom Room: 7

Time: Sundays 1:05 PM - 2:25 PM

Course Description

A conceptual introduction to Einstein's theories of Special and General Relativity. We will discuss time dilation, length contraction, spacetime diagrams, $E = mc^2$, and more through various fun paradoxes and their resolutions in Special Relativity. We will also introduce General Relativity and motivate it conceptually.

Prerequisites

High school algebra and trigonometry. Some familiarity with physics concepts in kinematics as well as familiarity with the concepts of force and energy will be helpful.

Schedule

The schedule is tentative and subject to change.

Week 1, 07/09: The Road to Relativity

- Galilean Transformations
- Pre-Relativity and the Ether
- Speed of Light and Roadway to Special Relativity

Week 02 and 03, 07/16 and 07/23: Lorentz Transformations

- Time Dilation
- Length Contraction
- Lorentz transformations

- Barn and Pole Paradox

Week 04, 07/30 Spacetime Diagrams

- The invariant interval
- Twin Paradox

Week 05, 8/6 Energy and Momentum

- Conservation of momentum
- $E = mc^2$

Week 06, 8/13 General Relativity

- Accelerating Reference Frames
- Equivalence Principle
- Geometry of Spacetime