

Phy408, Introduction to Relativity, Spring 2016
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Home page is <http://dau3.physics.sunysb.edu/html/relativity16.html>

Time TuTh 1:00-2:20PM , place PHYSICS P117

The main objective of the course is to introduce students to special and general relativity, their mathematical tools and physics applications. The course level is intermediate between undergrad and grad. I believe that mastering the tools of the subject can only come from problem solving, and therefore the course has extensive load of the homeworks. Those can be done by hand, but usage of Mathematica is encouraged. Homework grades will make 60% of the final grade, and the rest from the final written exam. The topics to be discussed include

- math tools:
 - coordinate transformations, invariants
 - co and contravariant vector and tensors,
 - from Cartesian to general coordinates
 - Metrics, general tensors, covariant derivatives, curvature
- special relativity
 - history
 - Lorentz transformations
 - Einstein's theory: solution to paradoxes
 - addition of velocities: rapidity
 - 4-vectors of position, velocity and acceleration
 - relativistic dynamics
- general relativity

- history
- motion in curved space: geodesics
- Schwarzschild solution and black holes
- Expanding Universe and Big Bang cosmology

The course is based on "A first course in General Relativity" by B.Schutz (second edition, Cambridge U. Press)