

## PHYSICS 161: Black Holes in the Cosmos

**Instructor:** Art Wolfe

**Office, Phone, and Email :** SERF 423, 534-7435, awolfe@ucsd.edu

**Office Hours:** Fri. after 10:30 A. M., or by appointment

**Main Text:** Hartle *General Relativity*

**Reserve Texts:**

Carroll & Ostlie *Modern Astrophysics*

Schutz *General Relativity*

Taylor & Wheeler *Spacetime Physics*

**Course Room:** SERF 329

**Time:** Tues. and Thurs. 9:30 A.M. to 10:50 A. M.

**Course Requirements:**

- (1) Graded Homework Assignments: 50 % of final grade
- (2) Term paper (and optional talk): 50 % of final grade

**TOPICS**

- Overview: Introduction to Black Holes and Gravitational Physics
- Review of Special Relativity
- Introduction to General Relativity: the Metric
- Geodesics, Curvature, and the Calculus of Variations
- Endpoints of Stellar Evolution: White Dwarfs, Neutron Stars, and Black Holes
- Geodesics in Schwarzschild Spacetime
- Schwarzschild Horizons
- Wormholes, Negative Energy
- Rotating Kerr Holes
- Hawking Radiation
- Observational Evidence for Black Holes
- Massive Black Holes in Galaxies
- Gravitational Radiation