ASTRONOMY BIZARRE (309N) *COSMIC CATASTROPHES*

Spring 2008

UNIQUE NUMBER: 49490

TIME, PLACE: MWF 1:00-2:00, WEL 3.502

INSTRUCTOR: J. Craig Wheeler - a theoretical astrophysicist specializing in exploding stars and related topics.

Office: RLM 17.230, phone: 471-6407
Email: wheel@astro.as.utexas.edu
Hours: MWF 2-3 PM or by arrangement; do not hesitate to talk to me if you have questions or problems. My job is to help.

TEACHING ASSISTANT:

Sean Couch
Office: RLM 15.202A
Phone: 471-8316
Email: smc@astro.as.utexas.edu
Hours: T-Th 11:00 AM-12:00 PM, or by appt.

GRADES: There will be four hour-long examinations each counting 25 percent of the grade. The exams are tentatively scheduled for 2/8, 2/29, 4/11, and 5/2. The exams will be multiple choice.

EXTRA CREDIT: sky watch project to identify objects or constellations containing objects like supernovae and black holes that are relevant to the course (5 points added to term average).

COURSE DESCRIPTION: This is a specialized course for non-science majors that will presume some knowledge of the basic astronomical concepts presented in Astronomy 301. There will be a minimum of mathematics, but a familiarity with basic algebra and scientific notation ("powers of ten") will be helpful.

COURSE CONTENT: Discussion of supernovae, neutron stars and black holes with applications to gamma-ray bursts, worm holes, determining the origin, state, and fate of the Universe, and hints of extra dimensions (see next page).

TEXT: The book was written by the instructor based on many years of teaching this class. It is titled ***Cosmic Catastrophes:*** *Exploding Stars, Black Holes and Mapping the Universe,* Second Edition, published by Cambridge University Press.

HELP SESSIONS: Weekly help sessions will be scheduled Thursday in RLM 15.216B at 5:00 – 6:00 PM to discuss class material and exams. These sessions and office hours allow a more nearly one-on-one relationship and are a valuable addition to the lecture. Another room may be scheduled before exams.

WEB SITE: http://www.as.utexas.edu/astronomy/education/spring08/wheeler/309n.html

ASTRONOMY 309N
Cosmic Catastrophes

Schedule

1. Setting the Stage: The Universe is a Strange Place (Week 1)
    a. Introduction
    b. Background – Gravity and Quantum Theory, Forces

2. Dancing with Stars (Weeks 2 – 3)
    a. Binary Stars
    b. Accretion Disks
    c. White Dwarfs

3. Stellar Catastrophes (Weeks 4 – 6)
    a. Supernovae
    b. Supernovae 1987A

4. Neutron Stars (Week 7)

5. Black Holes in Theory: Into the Abyss (Weeks 8 - 9)
    a. Event Horizon and Singularity
    b. Black Holes in Space and Time
    c. Black Hole Evaporation: Hawking Radiation
    d. Fundamental Properties of Black Holes
    e. Inside Black Holes

6. Black Holes in Fact: Exploring the Reality (Weeks 10 – 11)
    a. Black Hole X-ray Novae
    b. Miniquasars
    c. Supermassive Black Holes

7. The Universe: Long, Long Ago and Far, Far Away (Weeks 12 – 13)
    a. Gamma-Ray Bursts: the Birth of Black Holes
    b. Probing the Size, Shape, and Fate of the Universe with Supernovae

8. Black Holes, Worm Holes, and Beyond: the Frontiers (Week 14)
    a. Worm Holes
    b. Time Machines
    c. Quantum Gravity
    d. String Theory
    e. When the Singularity is not a Singularity
    f. Extra dimensions