ASTRONOMY 309N
Cosmic Catastrophes

Schedule

Lecture 1 – Discussion of Syllabus
Lecture 2 – The Universe is a strange place
Lecture 3 – Red giants, white dwarfs, supernovae
Lecture 4 – Historical supernovae
Lecture 5 – Extragalactic supernovae, common elements forged in stars
Lecture 6 – Categories of supernovae
Lecture 7 – Categories of supernovae (continued)
Exam 1
Lecture 8 – Gravity, thermal and quantum pressure
Lecture 9 – Evolution of massive stars
Lecture 10 – Evolution of massive stars, iron cores
Lecture 11 – Collapse of iron cores of massive stars, neutrinos
Lecture 12 – Formation of neutron stars, jets
Lecture 13 – Formation of jets (continued)
Lecture 14 – Physics of exploding white dwarfs
Lecture 15 – Physics of exploding white dwarfs (continued)
Exam 2
Lecture 16 – Evolution of stars in binary systems
Lecture 17 – Accretion disks, cataclysmic variables
Lecture 18 – Binary white dwarfs, gravitational radiation, light curves
Lecture 19 – What makes supernovae shine? Radioactive decay
Lecture 20 – SN 1987A
Lecture 21 – SN 1987A (continued)
Exam 3
Lecture 23 – Neutron stars in binary systems, soft gamma-ray repeaters, magnetars
Lecture 24 – Black holes, history, Newton versus Einstein, geometry
Lecture 25 – Curved space and gravity
Lecture 26 – Basic properties of black holes: event horizon and singularity
Lecture 27 – Black holes and time
Exam 4
Lecture 28 – Non-rotating, rotating black holes
Lecture 29 – Quantum gravity, Hawking radiation, fundamental properties
Lecture 30 – Observations of stellar-mass black holes
Lecture 31 – Supermassive black holes
Lecture 32 – Gamma-rays bursts and supernovae
Lecture 33 – Dark ages, dark matter, the expanding Universe
Lecture 34 – Supernovae and the Universe, the accelerating Universe, dark energy
Lecture 35 – Dark energy, quantum gravity, worm holes
Lecture 36 – Multiple dimensions, string theory
Lecture 37 – String theory, large extra dimensions, branes
Lecture 38 – String theory, brane worlds, string landscape, holographic universe
Exam 5