HE Astrophysics Syllabus

High-Energy Radiation Processes
Bremsstrahlung: thermal and non thermal; black body
Synchrotron
Inverse-Compton scattering
Hadronic gamma-rays and neutrinos

Compact Objects
White dwarfs: degenerate electron fluid
Neutron stars: Chandrasekhar mass; equation of state
Pulsars: Goldreich-Julian density; magnetosphere;
Black holes: orbits around BHs; jets

Hydrodynamics
Strong explosion: self-similar solutions
Shocks: jump conditions
Spherical equilibrium: Eddington luminosity;
Disks: thin/thick disks; angular momentum transport, MRI

Non-thermal particles
Cosmic rays: Galactic and extra-Galactic; propagation;
Fermi acceleration: second/first order
Diffusive shock acceleration
Magnetic reconnection

Astrophysical objects
Microquasars - high-energy binaries
Novae
Supernovae: mergers vs core collapse; radio SNe
Pulsars and PWNe
Supernova remnants
Active Galactic Nuclei
Gamma-Ray Bursts