PHY213 - STELLAR STRUCTURE AND EVOLUTION

Aims
Objectives

PHY213 - Syllabus

II. The observed properties of stars

introduction
observable properties of stars
the Hertzsprung-Russell diagram
the mass-luminosity relation
clusters of stars

III. The equations of stellar structure

introduction
timescales
equation of hydrostatic support
equation of mass conservation
accuracy of hydrostatic assumption
validity of spherical symmetry assumption
minimum value for central pressure of a star
virial theorem
minimum mean temperature of a star
state of stellar material
energy generation
equation of energy production
energy transport
convection
equation of radiative transport
solving the equations of stellar structure

IV. The physics of stellar interiors

introduction
equation of state of an ideal gas
mean molecular weight
equation of state of a degenerate gas
opacity
approximate form for opacity
energy release from nuclear reactions
occurrence of fusion reactions
hydrogen and helium burning
approximate form for energy release

V. The structure of main-sequence stars

introduction
homologous stellar models
the M-L and L-T_e relations
polytropes
solving the Lane-Emden equation
detailed stellar models

VI. The evolution of stars

introduction
the evolution of low-mass stars
the evolution of high-mass stars
removed from 2011 course: white dwarfs
removed from 2011 course: neutron stars
removed from 2011 course: black holes
removed from 2011 course: The lives of Binary stars

a brief history of binary stars
the birth of binary stars
the binary star zoo
the evolution of binary stars
why study binaries?