Module: Elective Advanced Lectures: Modern Astrophysics

Module No.: astro850

Course: Binary Stars

Course No.: astro8501

Category	Type	Language	Teaching hours	CP	Semester
Elective	Lecture with exercises	English	2+1	4	ST

Requirements for Participation:

Preparation:
Introductory astronomy and cosmology lectures, stars and stellar evolution

Form of Testing and Examination:
Written or oral examination, successful exercise work

Length of Course:
1 semester

Aims of the Course:
The course will provide the necessary understanding of the basic physics of binary stars, in particular orbits, mass-transfer, chemistry and the importance of binary stars and populations of binaries to modern astrophysics.

Contents of the Course:
Most stars are not alone, they orbit a companion in a binary star system. This course will address the evolution of such binary stars and their impact on the Universe. It will start by considering orbital dynamics and observations of binaries, followed by stellar interaction in the form of mass transfer by Roche-lobe overflow and wind mass transfer. The effect of duplicity on chemistry, rotation rates and orbital parameters will be studied with the emphasis on uniquely binary-star phenomena such as type Ia supernovae, thermonuclear novae and gamma-ray bursts. It will conclude with quantitative studies of populations of binary stars.

Recommended Literature:
An Introduction to Close Binary Stars - Hildtich - Cambridge University Press ISBN 0-421-79800-0
Interacting Binary Stars - Pringle and Wade - CUP (Out of print but you can find cheap second-hand copies on www.amazon.com) ISBN 0-521-26608-4
Evolutionary Processes in Binary and Multiple Stars - Eggleton - CUP ISBN 0-521-85557-8