Imperial College London

Module Outline

Astrophysics

Module Code	PHYS96004	FHEQ Level	Level 6
Pre-requisites	None	Co-requisites	None
Primary Department	Physics		
Module Leader	Prof Andrew Jaffe and Dr James Owen		
Additional Teaching Departments	None		
Teaching Staff	Prof Andrew Jaffe + Dr James Owen + Associate + Associate		

Programmes on which the Module is delivered	Core/Elective
All UG Physics programmes (F300, F303, F309, F325, F390, F3W3)	Elective

Learning Outcomes

On completing the Astrophysics course, students will:

- Be able to apply physical concepts with which they are already familiar (mechanics, thermodynamics, quantum mechanics) to explain the formation, existence and appearance of astronomical objects.
- Know the important forces, processes and physical scales associated with the different types of astronomical objects listed below.
- Be able to connect these phenomena with observations.

Description of Content

Star Formation

- why stars form out of interstellar gas
- Jeans instability and the Jeans swindle

Compact objects

- the equation of state for degenerate gases
- giant planets, brown dwarfs and their formation
- end stages of stellar evolution: white dwarfs, neutron stars and black holes

Interstellar medium

- dust
- optically thin radiative transfer
- diffuse interstellar clouds and the formation of absorption lines
- ionised nebulae and the formation of emission lines

Galaxies

- disk galaxies and rotation curves
- evidence for dark matter (or alternative gravity theories)
- observations of the Milky Way's rotation
- central super-massive black holes

Black holes

- basic physics of light and particles near the event horizon

Quasars

- accretion disks around black holes
- Eddington limit and efficiency
- quasars in the early universe

Gravitational Lensing

- Newtonian deflection calculation and relativistic correction

	• lens equation and magnification • multiple images, microlensing and arcs/rings		
Assessment		Assessment Type	Weighting
Written exam		Exam	100%
Learning & Teaching Hours	Independent Study Hours	Placement Hours	Total Hours
47	103	0	150
ECTS Credit	6	CATS Credit	12
Date of introduction	October 2016	Date of Last Revision	May 2020