Imperial College London

Module Specification (Curriculum Review)

Basic details

UID		Cohorts covered	Earliest cohort: 2023-24; Latest cohort:
Long title	Astrophysics		
New code	PHYS60014	New short title	

Brief description of module *(approx. 600 chars.)*:

This module provides an overview of important topics in contemporary astrophysics. We will discuss: compact objects (giant planets and brown dwarfs, white dwarfs, neutron stars) including their properties and formation; the interstellar medium and gaseous nebulae and how astronomical observations can be used to infer their properties; galactic dynamics and the evidence for dark matter; black holes and accretion onto them in quasars, and gravitational lensing.

464 characters

Available as a standalone module/ short course? N

Statutory details

	ECTS	CATS	Non-credit
Credit value	7.5	15	N

HECOS codes:

FHEQ level: Level 6

Allocation of study hours

	Hours	
Lectures	20	
Group teaching	16	*Incl. seminars, tutorials, problem classes.*
Lab/ practical	0	
Other scheduled	11	*Incl. project supervision, fieldwork, external visits.*
Independent study	140.5	*Incl. wider reading/ practice, follow-up work, completion of assessments, revisions.*
Placement	0	*Incl. work-based learning and study that occurs overseas.*
Total hours	187.5	
ECTS ratio	25.00	

Project/placement activity

Is placement activity allowed? No

Module delivery

Delivery mode	Taught/ Campus	Other	
Delivery term		Other	Term 1, exam in Term 3

Ownership

Primary department: Physics

Additional teaching departments	None
Delivery campus	South Kensington

Collaborative delivery

Collaborative delivery?	N

External institution	N/A
External department	N/A
External campus	N/A

Associated staff

Role	CID	Given name	Surname
Module Leader		Andrew	Jaffe
Lecturer		Yvonne	Unruh

Learning and teaching

Module description

Learning outcomes	On completion of this module you will be able to: - describe the formation and structure of compact stellar and sub-stellar objects - describe the physical processes in the interstellar medium and explain how its properties are inferred from observations - describe the structure and components of galaxies (stars, gas, dark matter) - describe accretion processes around supermassive black holes - describe, state and apply the theory and phenomenology of gravitational lensing
Module content	• Compact Objects - The virial theorem for objects in hydrostatic equilibrium, the equations of state for a degenerate fermion gas, the mass-radius relation for compact objects and the Chandrasekhar mass limit for white dwarfs. • The Interstellar medium - Properties of the interstellar medium, the transfer of radiation through diffuse regions containing dust and gas, ionisation and recombination processes and Stromgren spheres. • Galaxies – disk galaxies and rotation curves; evidence for dark matter; central super-massive black holes • Quasars – accretion disks around black holes; Eddington limit and efficiency • Gravitational Lensing – lens equation and magnification; multiple images, microlensing and arcs/rings
Learning and Teaching Approach	Students will be taught over one term using a combination of lectures, seminars, rapid feedback sessions office hours and directed exercises on theoretical work.
Assessment Strategy	100% summative assessment based on final exam: written exam of two hours.

Feedback	Problem sheets are provided weekly with questions and examples students can practise with. There are in-person rapid feedback sessions which go over roughly one question per week.
Reading list	There is no prescribed textbook for the astrophysics option. Handouts and lecture notes and provided that are self-contained. There are several optional recommended text books for students wishing to explore topic in more depth. Two standard text books that cover most of the material are: • Introductory Astronomy & Astrophysics by Zeilik & Gregory (Saunders College Publishing, 4th edition) • An Introduction to Modern Astrophysics, by Carroll & Ostlie (Addison Wesley). None of the above cover the section on Interstellar matter and diffuse nebulae very extensively. A book that mirrors the structure of the course is: • Principles of Astrophysics by Charles Keeton (Springer 2014). Another book that does cover almost all of the material in the course is: • The Tapestry of Modern Astrophysics by Steven N. Shore (John Wiley & Sons).

Quality assurance

Date of first approval	
Date of last revision	
Date of this approval	
Module leader	Andrew Jaffe

Office use only

QA Lead	
Department staff	
Date of collection	
Date exported	
Date imported	

Notes/ comments

Template version 16/06/2017

Programme structure
Associated modules

UID	Legacy code	Module title	Requisite type

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Assessment details

		Pass mark
Grading method	Numeric	40%

Assessments

Assessment type	Assessment description	Weighting	Pass mark	Must pass?
			40%	
Examination	Written exam of two hours	100%	40%%	N
		100%		