

PX397-7.5 Galaxies

20/21

Department

Physics

Level

Undergraduate Level 3

Module leader

Matteo Brogi

Credit value

7.5

Module duration

5 weeks

Assessment

100% exam

Study location

University of Warwick main campus, Coventry

Description

Introductory description

A galaxy is a system of stars, dust, stellar remnants and other bodies bound by gravity. For example, the Milky Way (our galaxy) is estimated to contain around 300bn stars and at least 100bn planets. Galaxies usually form groups, also bound by their gravitational interaction, and these groups themselves tend to be part of even larger superclusters. In this module, we will see that we can put together appealing and, sometimes quite simple, explanations of what we observe in these complex systems.

[Module web page](#)

Module aims

To illustrate how important physical principles, from different areas of physics, can be developed to yield a description of complex physical systems like galaxies.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

1. Galaxy classification; the Hubble Tuning Fork; elliptical and spiral galaxies; surface

- brightness profiles.
2. The Milky Way, its structure and properties; the role of stellar populations and the interstellar medium.
 3. Galaxy populations; luminosity functions, star formation vs AGN, radio galaxies and seyferts.
 4. Galaxy kinematics; Tully-Fisher relation; rotation curves; dark matter; virial mass
 5. The role and origin of dust and gas in galaxies; dust extinction laws; types of dusty galaxies
 6. Introduction to galaxies at large scale: the Local Group and nearby clusters

Learning outcomes

By the end of the module, students should be able to:

- Describe the structure of our own Galaxy and how it fits into the 'zoo' of galaxies distributed through the Universe;
- Explain the physical principles behind the observations used to study galaxies
- Discuss the outstanding problems in the study of galaxies including the nature of galaxy cores and the roles of dark matter and dust

Indicative reading list

S Philipps, The Structure and Evolution of Galaxies, Wiley, 2005

[View reading list on Talis Aspire](#)

Subject specific skills

Knowledge of mathematics and physics. Skills in modelling, reasoning, thinking.

Transferable skills

Analytical, communication, problem-solving, self-study

Study

Study time

Type	Required
Lectures	15 sessions of 1 hour (20%)
Private study	60 hours (80%)
Total	75 hours

Private study description

Working through lecture notes, solving problems, wider reading, discussing with others taking the module, revising for exam, practising on past exam papers

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group B1

	Weighting	Study time
In-person Examination	100%	
Answer 2 questions from 3		

Feedback on assessment

Personal tutor, group feedback

[Past exam papers for PX397](#)

Availability

Courses

This module is Option list A for:

- UPXA-F300 Undergraduate Physics (BSc)
 - Year 3 of F300 Physics
 - Year 3 of F300 Physics
 - Year 3 of F300 Physics
- UPXA-F303 Undergraduate Physics (MPhys)
 - Year 3 of F300 Physics
 - Year 3 of F303 Physics (MPhys)
- Year 4 of UPXA-F301 Undergraduate Physics (with Intercalated Year)

This module is Option list B for:

- UMAA-G105 Undergraduate Master of Mathematics (with Intercalated Year)
 - Year 3 of G105 Mathematics (MMath) with Intercalated Year
 - Year 5 of G105 Mathematics (MMath) with Intercalated Year

- UMAA-G100 Undergraduate Mathematics (BSc)
 - Year 3 of G100 Mathematics
 - Year 3 of G100 Mathematics
 - Year 3 of G100 Mathematics
- UMAA-G103 Undergraduate Mathematics (MMath)
 - Year 3 of G100 Mathematics
 - Year 3 of G103 Mathematics (MMath)
 - Year 3 of G103 Mathematics (MMath)
 - Year 4 of G103 Mathematics (MMath)
 - Year 4 of G103 Mathematics (MMath)
- UMAA-G106 Undergraduate Mathematics (MMath) with Study in Europe
 - Year 3 of G106 Mathematics (MMath) with Study in Europe
 - Year 4 of G106 Mathematics (MMath) with Study in Europe
- Year 3 of UPXA-FG33 Undergraduate Mathematics and Physics (BSc MMathPhys)
- UPXA-GF13 Undergraduate Mathematics and Physics (BSc)
 - Year 3 of GF13 Mathematics and Physics
 - Year 3 of GF13 Mathematics and Physics
- UPXA-FG31 Undergraduate Mathematics and Physics (MMathPhys)
 - Year 3 of FG31 Mathematics and Physics (MMathPhys)
 - Year 3 of FG31 Mathematics and Physics (MMathPhys)
- Year 4 of UPXA-GF14 Undergraduate Mathematics and Physics (with Intercalated Year)
- Year 4 of UMAA-G101 Undergraduate Mathematics with Intercalated Year
- Year 3 of UPXA-F303 Undergraduate Physics (MPhys)