# Module Proforma

**Approved, 2022.06**

## Summary Information

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|---|---|
| **Module Code** | 7010ASTPHY |
| **Formal Module Title** | Astrophysical Concepts |
| **Owning School** | Astrophysics Research Institute |
| **Career** | Postgraduate Taught |
| **Credits** | 30 |
| **Academic level** | FHEQ Level 7 |
| **Grading Schema** | 50 |

## Module Contacts

### Module Leader

| Contact Name | Applies to all offerings | Offerings |
|---|---|---|
| Benjamin Davies | Yes | N/A |

### Module Team Member

| Contact Name | Applies to all offerings | Offerings |
|---|---|---|
| Stacey Habergham-Mawson | Yes | N/A |
| Fiona Murphy-Glaysher | Yes | N/A |
| Matthew Darnley | Yes | N/A |
| Marie Martig | Yes | N/A |

### Partner Module Team

| Contact Name | Applies to all offerings | Offerings |
|---|---|---|

## Teaching Responsibility

| LJMU Schools involved in Delivery |
|---|
| Astrophysics Research Institute |

## Learning Methods

| Learning Method Type | Hours |
|---|---|
| Online | 45 |

## Module Offering(s)

| Offering Code | Location | Start Month | Duration |
|---|---|---|---|
| SEP-CTY | CTY | September | 12 Weeks |

## Aims and Outcomes

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|---|---|
| **Aims** | * To develop a firm grounding in orbital mechanics and current knowledge of the formation and evolution of planetary systems* To provide students with an understanding of the physical processes whichdetermine all aspects of the structure of stars and stellar atmospheres.* To introduce students to the nature of stellar evolution* To introduce students to the diversity of galaxy morphologies, dynamics evolution andcomponents.* To illustrate the importance of multi-wavelength observational approaches to thestudy of galaxies.* To provide students with an introduction to modern observational cosmology and various cosmological models. |

## Learning Outcomes

**After completing the module the student should be able to:**

| Code | Description |
|---|---|
| MLO1 | Demonstrate a detailed knowledge and comprehensive understanding of astrophysical concepts |
| MLO2 | Utilise that content to describe a detailed coherent picture of the constituent components of the universe and how they develop |
| MLO3 | Apply an in-depth knowledge of physical and mathematical techniques to effectively solve astronomical problems |

## Module Content

**Outline Syllabus**

1. Kepler's Laws and the generalisation to Newton's Law of Universal Gravitation; applying Gravity: Tidal interactions, Roche Limits and the Virial Theorem.2. Formation of planetary systems, including the Solar System and techniques for detecting exoplanets.3. Introduction to stellar properties and observables; equations of hydrostatic equilibrium, mass conservation, energy generation and transport. 4. Stellar Interiors and Atmospheres; radiative transfer, spectral lines, model stellar spectra. Main-sequence stars and their post main-sequence evolution5. Galaxy classifications; stellar and gas contents, sizes and luminosities for differenttypes, with the Milky Way as an important example6. Multi-wavelength studies of galaxies, with particular emphasis on gas, and dust asboth an obscuring (optical/UV) and emitting (thermal IR, ULIRGs etc) component7. Overview of galaxy formation and evolution in a Lambda-CDM cosmology8. Introduction to Cosmology: Isotropy and Homogeneity; Galaxies, clusters and superclusters.9. Geometry of the Universe and Dynamical evolution.

**Module Overview**

This module develops your understanding of concepts in astrophysics. It:

develops your knowledge of grounding in orbital mechanics and the formation and evolution of planetary systems

provides an understanding of the physical processes which determine all aspects of the structure and evolution of the interstellar medium and stars (ISM)

provides a firm physical framework for this appreciation by investigating the mechanisms which govern the structure and appearance of the ISM

introduces you to the diversity of galaxy morphologies, dynamics evolution and components

allows you to illustrate the importance of multi-wavelength observational approaches to the study of galaxies

provides an introduction to modern observational cosmology and various cosmological models

**Additional Information**

This module is designed to introduce astrophysics concepts to students who have completed undergraduate degrees in other scientific subjects.There will be particular emphasis on developing independent learning skills and IT capability to access and extract relevant scientific information via Canvas and databases available from LJMU.Module is delivered by distance learning.

## Assessments

| Assignment Category | Assessment Name | Weight | Exam/Test Length (hours) | Learning Outcome Mapping |
|---|---|---|---|---|
| Test | Online Final Test | 70 | 3 | MLO1, MLO3, MLO2 |
| Test | Tests | 30 | 0 | MLO1, MLO3, MLO2 |