

**Summary Information**

<b>Module Code</b>	7016ASTPHY
<b>Formal Module Title</b>	Time-Domain Astrophysics
<b>Owning School</b>	Astrophysics Research Institute
<b>Career</b>	Postgraduate Taught
<b>Credits</b>	30
<b>Academic level</b>	FHEQ Level 7
<b>Grading Schema</b>	50

**Module Contacts**
**Module Leader**

Contact Name	Applies to all offerings	Offerings
Matthew Darnley	Yes	N/A

**Module Team Member**

Contact Name	Applies to all offerings	Offerings
Fiona Murphy-Glaysher	Yes	N/A
K-Ryan Hinds	Yes	N/A
Daniel Perley	Yes	N/A
Christopher Copperwheat	Yes	N/A
Stacey Habergham-Mawson	Yes	N/A
Shiho Kobayashi	Yes	N/A
Paolo Mazzali	Yes	N/A

**Partner Module Team**

Contact Name	Applies to all offerings	Offerings
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## Teaching Responsibility

<b>LJMU Schools involved in Delivery</b>
Astrophysics Research Institute

## Learning Methods

Learning Method Type	Hours
Online	32

## Module Offering(s)

Offering Code	Location	Start Month	Duration
JAN-CTY	CTY	January	12 Weeks

## Aims and Outcomes

<b>Aims</b>	The main aim of this module is to develop an understanding of the variable/transient Universe, and the techniques and facilities used to investigate this realm. Particularly, a good understanding of the physical processes driving phenomena such as, for example, explosive transients, will be sought, along with an appreciation of the wider importance and impact of such systems.
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## Learning Outcomes

After completing the module the student should be able to:

Code	Description
MLO1	Demonstrate a detailed knowledge and understanding of time-domain astrophysics.
MLO2	Use the course content to coherently describe the physical nature of variable/transient astrophysical phenomena (e.g. SNe, GRBs)
MLO3	Show familiarity with the specific observational techniques and facilities used to identify and study variable/transient phenomena

## Module Content

### Outline Syllabus

1. Historical time domain astrophysics; the context leading to the general state of the field today (e.g. expansion parallax, proper motions, pulsars, etc.)  
2. Techniques specific to and developed for time domain astrophysics (e.g. difference image analysis)  
3. Facilities developed for or supporting time domain observations; existing and future (e.g. LT2, LSST, SKA, etc.)  
4. Explosive transient phenomena; Novae, thermonuclear Supernovae, core collapse Supernovae, 'exotic' SNe, Gamma Ray Bursts – characteristics, progenitor systems including formation, populations, importance – general concepts, e.g. Luminosity vs time-scale plot  
5. Selected variable (periodic and quasi-periodic) phenomena; e.g. pulsating variables, Cepheids, Miras (link to cosmic distance scale, as with type Ia supernovae), pulsars – characteristics, formation, populations  
6. General transients, e.g. tidal disruption events, Luminous blue variables, dwarf novae, general cataclysmic variables, x-ray transients, active galactic nuclei, potential gravitational waves sources – characteristics, formation, populations  
7. Extra solar planet discovery techniques, e.g. transits, radial velocity, astrometric, gravitational microlensing

### Module Overview

This module aims to develop your understanding of the variable/transient Universe, and the techniques and facilities used to investigate this realm. It provides a sound understanding of the physical processes driving phenomena such as explosive transients. It:

introduces the concepts of time domain astrophysics and the techniques used to analyse and understand it  
develops your independent learning skills and IT capability to access and extract relevant scientific information

### Additional Information

This module is designed to introduce the concepts of time domain astrophysics to students, both the astrophysical sources showing strong variation over time and the techniques used to analyse and understand these. There will be particular emphasis on developing independent learning skills and IT capability to access and extract relevant scientific information via the VLE and databases available from LJMU. Module delivered by distance learning.

## Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Learning Outcome Mapping
Test	End of course Test	50	3	MLO3, MLO1, MLO2
Report	Data Exercise	25	0	MLO3, MLO1, MLO2
Essay	Case Study Essay	25	0	MLO3, MLO1, MLO2