Liverpool John Moores University

Title:	GAMMA-RAY BURSTS
Status:	Definitive
Code:	**4013ASTRON** (101075)
Version Start Date:	01-08-2011
Owning School/Faculty:	Astrophysics Research Institute
Teaching School/Faculty:	Astrophysics Research Institute

Team	Leader
Andrew Newsam	Y
David Hyder	

Academic Level:	FHEQ4	**Credit Value:**	12.00	**Total Delivered Hours:**	100.00
Total Learning Hours:	120	**Private Study:**	20		

Delivery Options
Course typically offered: Summer

Component	Contact Hours
Online	14.000
Practical	80.000
Tutorial	6.000

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	AS1	Practical computer exercise (determine an optical afterglow light curve)	50.0	
Essay	AS2	Popular Essay	25.0	
Test	AS3	Multiple choice online test	25.0	

Aims

This course presents a broad overview of the field of gamma-ray bursts and looks at our current understanding of these enigmatic objects. The course will describe the history of the field and emphasize recent advances in this still very young field.

Learning Outcomes

After completing the module the student should be able to:

1 Have an appreciation of the key ideas and the basic physical mechanisms to solve paradoxes in GRBs.
2 Have an appreciation of the various phases and components of a GRB (progenitors, prompt emission, afterglow).
3 Have an appreciation of the use of multi-wavelength observations to study GRBs.
4 Describe the use of gamma-ray bursts in astronomy in general.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

REPORT	2	3		
ESSAY	1	4		
TEST	1	2	3	4

Outline Syllabus

1. What are gamma-rays?: wavelengths and frequencies of light; instruments and techniques used.
2. Historical background: discovery of GRBs, GRB models in the pre-afterglow era.
3. A physical look at GRBs: compact fireballs, black holes, physics in extreme environments.
4. The 1st breakthrough: distribution on the sky: classes of bursts.
5. The 2nd breakthrough: discovery of afterglows: distances to GRBs.
6. Why and how they shine?: afterglows across the electromagnetic spectrum.
7. Where do they come from?: Giant stellar explosions; smashing stars
8. What are GRBs good for?: Their place and use in modern astronomy. Open issues.

Learning Activities

CD-ROM notes, multiple choice questions and exercises, multi-media and web resources and email interaction with tutors.

References

Course Material	Book
Author	Schilling, G

Publishing Year	2002
Title	Flash!: The Hunt for the Biggest Explosions in the Universe
Subtitle	
Edition	
Publisher	Cambridge University Press
ISBN	

Course Material	Book
Author	Katz, J.I.
Publishing Year	2002
Title	The Biggest Bangs: The Mystery of Gamma-Ray Bursts, the Most Violent Explosions in the Universe
Subtitle	
Edition	
Publisher	Oxford University Press
ISBN	

Notes

This module will give students an understanding of all aspects of this complex and rapidly evolving field.